W. and D. Downey, London and Newcastle.

THE LITTLE MOTHER.

TAKEN ON A PAGET PRIZE PLATE COMPANY'S RAPID DRY PLATE,

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AND

Photographer's Daily Companion,

FOR

1882.

EDITED BY W. B. BOLTON.

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N

PREFACE.

As the close of the work of compiling The British Journal Photographic Almanac for 1882 approaches, it becomes necessary to pen the introductory remarks, which have been said to be the most difficult part of a book to write. If this difficulty present itself in the case of a work due solely to an author's own brain and pen, with how much greater force must it press upon the Editor whose duties are confined to the collation and arrangement of the thoughts and ideas of a vast number of kind friends whose experiences are presented for the benefit of their fellows! He cannot undertake the invidious task of pointing to any particular portion of his work as being specially commendable. It is not his mission to divert into one given channel the attention of his numerous readers, whose tastes and opinions and requirements may be widely different. Hence I content myself with simply laying before the public the present volume, leaving them to judge of its merits from their own individual standpoints.

I have to thank, one and all, the large number of writers who have given me their kind assistance; and who, by their ready response to my appeal for aid, have enabled us to repeat the experiment initiated last year of publishing at an earlier date than has been usual in previous years. The very numerous expressions of satisfaction which reached me in connection with this innovation encouraged me in the attempt, not only to repeat but to adopt it as the rule as long as I may be spared to edit this annual volume.

I am fortunate in being able to add to the attractions of the book in the shape of the charming *petite* study of *The Little Mother* which forms its frontispiece; and I must not fail to tender my sincere thanks to the Woodbury Permanent Photographic Printing Company, to the Paget Prize Dry Plate Company, and to Messrs. W. and D. Downey for their respective parts in providing this illustration.

W. B. Bolton,
Editor.

2, York Street, Covent Garden, W.C.,
December 20, 1881.

JANUARY.

D M	D W	REMARKABLE DAYS.	SUN Rises. H.	SUN Rises. M.	SUN Sets. H.	SUN Sets. M.	MOON Rises. After.	MOON Sets. Morn.
1	S	1 Sunday after Christmas	8	8	4	0	1 45	5 18
2	M	*West Riding of Yorks. Photo. Soc.*	8	8	4	1	2 35	6 15
3	Tu	*Sheffield Phot. Soc. [Phot. Benev. As.*	8	8	4	2	3 33	7 4
4	W	*Edin. Photo. Soc., Bristol Am., and*	8	8	4	3	4 35	7 44
5	Th	*S. Lond. Photo. Soc., Bolton Phot. Soc.,*	8	8	4	4	5 39	8 15
6	Fr	*[Glasgow Pho. Ass. & Dundee Pho. Ass.*	8	7	4	6	6 45	8 41
7	Sa	St. Distaff. Fenelon died, 1715	8	7	4	7	7 50	9 4
8	S	1 Sunday after Epiphany	8	6	4	8	8 54	9 24
9	M	*[Tyne Photo. Ass. (Ann. Meet.)*	8	6	4	9	9 58	9 42
10	Tu	*Photo. Soc. of Gt. Brit., N'castle-on-*	8	5	4	10	11 5	10 0
11	W	*Chelt. Am. Photo. Soc. (Ann. Meet.)*	8	5	4	12	Morn	10 19
12	Th	*Manchester Photographic Society*	8	4	4	14	0 12	10 39
13	Fr	*Photographic Society of Ireland*	8	3	4	15	1 20	11 3
14	Sa	Oxford Lent Term begins	8	2	4	17	2 30	11 34
15	S	2 Sunday after Epiphany	8	1	4	19	3 40	After
16	M	Battle of Corunna, 1809	8	0	4	20	4 47	1 1
17	Tu	Battle of Falkirk, 1756	7	59	4	21	5 49	2 3
18	W	Prisca, V. and M.	7	58	4	23	6 41	3 16
19	Th	James Watt born, 1736	7	57	4	24	7 23	4 38
20	Fr	London Docks opened, 1805	7	56	4	26	7 58	6 3
21	Sa	St. Agnes	7	55	4	28	8 26	7 29
22	S	3 Sunday after Epiphany	7	54	4	30	8 51	8 54
23	M	Wm. Pitt died, 1806	7	53	4	32	9 14	10 16
24	Tu	Adam Black (publisher) d., 1874	7	52	4	33	9 38	11 35
25	W	Conversion of St. Paul	7	51	4	34	10 5	Morn
26	Th	*Liverpool Amateur Photo. Asso., and*	7	50	4	36	10 31	0 53
27	Fr	*[Oldham Photographic Society*	7	49	4	38	11 5	2 5
28	Sa	Prescott died, 1859	7	48	4	40	11 45	3 12
29	S	4 Sunday after Epiphany	7	46	4	42	After	4 10
30	M	Charles I. beheaded, 1649	7	45	4	44	1 27	5 2
31	Tu	Sun rises 7h. 42m.	7	43	4	46	2 28	5 43

FEBRUARY.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
		[and Photo. Benevolent Asso.				
1	W	*Edin. Ph. So., Bristol Am. (An. Meet),*	7 41	4 48	3 29	6 17
2	Th	*South London Photographic Society,*	7 40	4 49	4 35	6 46
3	Fr	*[Glasgow Photo. Asso., Dundee Photo.*	7 38	4 50	5 39	7 9
4	Sa	*[Asso., and Bolton Photo. Society*	7 36	4 52	6 45	7 30
5	S	**Septuagesima**	7 34	4 54	7 48	7 49
6	M	*West Riding of Yorks. Photo. Soc.*	7 32	4 56	8 55	8 7
7	Tu	*Sheffield Photographic Society*	7 30	4 57	10 1	8 26
8	W	*Cheltenham Amateur Photo. Society*	7 29	4 59	11 7	8 46
9	Th	*Manchester Photographic Society*	7 27	5 0	Morn	9 8
10	Fr	*Photographic Society of Ireland*	7 25	5 2	0 16	9 35
11	Sa	Battle of Sobraon, 1845	7 24	5 4	1 24	10 9
12	S	**Sexagesima**	7 22	5 6	2 30	10 51
13	M	C. J. Fox died, 1806	7 20	5 8	3 32	11 44
14	Tu	*Photo. Soc. of Gt. Brit. (Ann. Meet.),*	7 18	5 10	4 27	After
15	W	*[Newcastle-on-Tyne Photo. Ass.*	7 16	5 12	5 13	2 5
16	Th	Melancthon born, 1495	7 14	5 14	5 51	3 28
17	Fr	J. B. Molière died, 1673 [d. 1869	7 12	5 16	6 24	4 54
18	Sa	G. Peabody, Am. philanth., b. 1795,	7 11	5 18	6 51	6 22
19	S	**Quinquagesima**	7 9	5 19	7 15	7 48
20	M	Joseph Hume died, 1855	7 7	5 21	7 39	9 11
21	Tu	Sun sets 5h. 23m.	7 5	5 23	8 5	10 31
22	W	Ash Wednesday	7 3	5 25	8 33	11 48
23	Th	*Liverpool Amateur Photo. Asso., and*	7 1	5 27	9 7	Morn
24	Fr	*[Oldham Photo. Society*	6 59	5 29	9 45	0 59
25	Sa	Sir C. Wren died, 1723	6 56	5 30	10 32	2 1
26	S	**1 Sunday in Lent** [1875	6 54	5 32	11 24	2 56
27	M	Sir C. Lyell buried at Westminster,	6 52	5 34	After	3 42
28	Tu	Elliott's engagement, 1760, off [Ramsey Bay	6 50	5 36	1 22	4 18

MARCH.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
		[Photo. Benevolent Asso.				
1	W	*Edin. Photo. Soc., Bristol Am., and*	6 48	5 37	2 26	4 49
2	Th	*South London Photographic Society*	6 46	5 39	3 31	5 13
3	Fr	*[Glasgow Photo. Asso., Dundee Photo.*	6 44	5 41	4 36	5 36
4	Sa	*[Asso., and Bolton Photo. Society*	6 42	5 43	5 40	5 56
5	S	2 Sunday in Lent	6 40	5 45	6 46	6 15
6	M	*West Riding of Yorks. Photo. Soc.*	6 38	5 46	7 51	6 34
7	Tu	*Sheffield Photographic Society*	6 36	5 48	8 58	6 52
8	W	*Cheltenham Amateur Photo. Society*	6 34	5 50	10 6	7 14
9	Th	*Manchester Photographic Society*	6 31	5 51	11 13	7 41
10	Fr	*Photographic Society of Ireland*	6 28	5 53	Morn	8 11
11	Sa	Benjamin West died, 1820	6 26	5 55	0 19	8 49
12	S	3 Sunday in Lent [1881	6 23	5 57	1 20	9 37
13	M	Emperor of Russia assassinated,	6 21	5 58	2 17	10 35
14	Tu	*Photo. Society of Great Britain, and*	6 18	6 0	3 5	11 45
15	W	*[Newcastle-on-Tyne Photo. Ass.*	6 16	6 2	3 45	After
16	Th	Duchess of Kent died, 1861	6 13	6 4	4 18	2 22
17	Fr	St. Patrick's Day	6 11	6 6	4 48	3 47
18	Sa	P. Louise (March. Lorne) b., 1848	6 9	6 8	5 13	5 12
19	S	4 Sunday in Lent	6 7	6 10	5 37	6 37
20	M	Sir Isaac Newton died, 1727	6 5	6 11	6 5	8 1
21	Tu	Sun sets 6h. 12m.	6 3	6 12	6 33	9 22
22	W	German Emperor born, 1797	6 1	6 14	7 5	10 39
23	Th	National Gallery founded, 1824	5 59	6 15	7 41	11 47
24	Fr	Great Seal England stolen, 1783	5 57	6 17	8 26	Morn
25	Sa	Lady Day	5 54	6 18	9 17	0 46
26	S	5 Sunday in Lent	5 52	6 20	10 13	1 36
27	M	James I. died, 1625	5 50	6 22	11 14	2 16
28	Tu	Sun rises 5h. 46m.	5 48	6 24	After	2 49
29	W	Rev. J. Keble died, 1866	5 45	6 26	1 22	3 16
30	Th	*Liverpool Amateur Photo. Asso., and*	5 43	6 28	2 27	3 41
31	Fr	*[Oldham Photo. Society*	5 41	6 30	3 30	4 1

APRIL.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	Sa	Prince Bismarck born, 1814	5 38	6 31	4 35	4 20
2	**S**	**Palm Sunday**	5 36	6 33	5 41	4 39
3	M	*West Riding of Yorks. Photo. Soc.*	5 34	6 35	6 48	4 59
4	Tu	*Sheffield Pho. Soc.* [*Phot. Benev. As.*	5 32	6 37	7 55	5 20
5	W	*Edin. Photo. Soc., Bristol Am., and*	5 29	6 38	9 4	5 45
6	Th	*S London Pho. Soc., Glasgow Ph. As.,*	5 27	6 40	10 11	6 14
7	Fr	[*Dundee (An Meet.), & Bolton So.*	5 24	6 41	11 15	6 51
8	Sa	J. Loudon born, 1783	5 22	6 43	Morn	7 35
9	**S**	**Easter Sunday**	5 20	6 44	0 11	8 30
10	M	Bank Holiday [*on-Tyne Photo. As.*	5 18	6 45	1 1	9 36
11	Tu	*Photo. Soc. of Gt. Brit., and Newcastle-*	5 15	6 46	1 42	10 46
12	W	*Cheltenham Amateur Photo. Society*	5 13	6 48	2 17	After
13	Th	*Manchester Photographic Society*	5 11	6 50	2 47	1 25
14	Fr	*Photographic Society of Ireland*	5 9	6 52	3 13	2 46
15	Sa	14—Pres. Lincoln assass., 1865	5 7	6 53	3 38	4 10
16	**S**	**1 Sunday after Easter**	5 5	6 55	4 2	5 31
17	M	Magdala burnt, 1868	5 2	6 57	4 29	6 52
18	Tu	Easter Law Sittings begin	5 0	6 59	4 58	8 12
19	W	Lord Beaconsfield died, 1881	4 58	7 0	5 34	9 26
20	Th	Napoleon III. born, 1808	4 56	7 2	6 15	10 30
21	Fr	Peter Abelard died, 1142	4 55	7 4	7 5	11 26
22	Sa	Odessa bombarded, 1854	4 53	7 6	8 0	Morn
23	**S**	**2 Sunday after Easter**	4 51	7 8	9 2	0 12
24	M	Defoe died, 1731	4 49	7 10	10 6	0 48
25	Tu	St. Mark, evangelist	4 47	7 11	11 12	1 18
26	W	Great eruption of Vesuvius, 1872	4 45	7 13	After	1 43
27	Th	*Liverpool Amateur Photo. Asso., and*	4 43	7 14	1 20	2 5
28	Fr	[*Oldham Photographic Society*	4 41	7 16	2 22	2 25
29	S	Dr. Lardner died, 1859	4 39	7 17	3 28	2 44
30	**S**	**3 Sunday after Easter**	4 37	7 19	4 35	3 2

MAY.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	M	*West Riding of Yorks. Photo. Soc.*	4 35	7 21	5 43	3 23
2	Tu	*Sheffield Photo. Soc. [Benev. Asso.*	4 33	7 23	6 52	3 48
3	W	*Edin. Photo. Soc., Bristol Am., and*	4 31	7 24	7 59	4 15
4	Th	*South London Photographic Society,*	4 29	7 26	9 7	4 50
5	Fr	*[and Bolton Photographic Society*	4 28	7 27	10 7	5 33
6	Sa	Postage Stamps introduced, 1840	4 26	7 29	10 58	6 25
7	S	4 Sunday after Easter	4 24	7 30	11 42	7 27
8	M	Danish Treaty, 1852 [*Tyne Pho. As.*	4 22	7 32	Morn	8 37
9	Tu	*Pho. Soc. of Gt. Brit., & Newcastle-on-*	4 21	7 33	0 19	9 53
10	W	*Cheltenham Amateur Photo. Society*	4 19	7 35	0 51	11 11
11	Th	*Manchester Photographic Society*	4 17	7 36	1 17	After
12	Fr	*Photographic Society of Ireland*	4 15	7 38	1 41	1 49
13	Sa	Pope Pius IX. born, 1792	4 14	7 39	2 5	3 9
14	S	Rogation Sunday	4 12	7 41	2 30	4 29
15	M	Whitsuntide Term (Scotland)	4 11	7 42	2 57	5 48
16	Tu	Vendôme Column destroyed, 1871	4 10	7 44	3 28	7 4
17	W	P. O. Saving Banks estab., 1861	4 8	7 45	4 7	8 13
18	Th	Royal Literary Fund consti., 1790	4 6	7 47	4 52	9 13
19	F	Ardahan captrd. by Russians, 1877	4 5	7 48	5 47	10 3
20	Sa	Christopher Columbus died, 1506	4 4	7 49	6 47	10 45
21	S	Sunday after Ascension	4 3	7 50	7 49	11 18
22	M	Alexander Pope born, 1688	4 2	7 52	8 55	11 44
23	Tu	Mark Lemon died, 1870	4 0	7 53	10 1	Morn
24	W	Queen Victoria born, 1819	3 59	7 55	11 6	0 8
25	Th	*Liverpool Amateur Photo. Asso., and*	3 58	7 56	After	0 29
26	F	*[Oldham Photographic Society*	3 57	7 58	1 15	0 49
27	Sa	Oxford Trinity Term begins	3 56	7 59	2 20	1 7
28	S	Whit Sunday	3 55	8 0	3 27	1 27
29	M	Bank and general holiday	3 54	8 1	4 35	1 49
30	Tu	Pope died, 1744	3 53	8 2	5 44	2 15
31	W	Sun rises 3h. 51m.	3 52	8 3	6 50	2 46

JUNE.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	Th	*South London Photographic Society,*	3 51	8 4	7 55	3 27
2	Fr	*[and Bolton Photo. Society*	3 51	8 5	8 53	4 16
3	Sa	George III. born, 1738	3 50	8 6	9 41	5 16
4	S	**Trinity Sunday**	3 50	8 7	10 21	6 26
5	M	Gas introduced, 1807	3 49	8 8	10 55	7 41
6	Tu	*Sheffield Photographic Society*	3 48	8 9	11 21	8 59
7	W	*Edin. Photo. Soc., Bristol Amateur, &*	3 47	8 10	11 47	10 19
8	Th	Corpus Christi. *[Photo. Benev. As.*	3 47	8 11	Morn	11 37
9	Fr	Charles Dickens died, 1870	3 46	8 11	0 9	After
10	Sa	Crystal Palace opened, 1854	3 46	8 12	0 34	2 15
11	S	**1 Sunday after Trinity**	3 45	8 13	0 59	3 33
12	M	Dr. Arnold died, 1842	3 45	8 14	1 29	4 48
13	Tu	*Photo. Society of Great Britain, and*	3 45	8 15	2 4	5 58
14	W	*[Newcastle-on-Tyne Photo. Assoc.*	3 45	8 16	2 44	7 2
15	Th	Thomas Campbell died, 1844	3 44	8 16	3 34	7 56
16	Fr	Duke of Marlborough died, 1722	3 44	8 16	4 31	8 39
17	Sa	Addison died, 1719	3 44	8 16	5 33	9 16
18	S	**2 Sunday after Trinity**	3 44	8 17	6 39	9 46
19	M	Magna Charta, 1216	3 44	8 17	7 47	10 11
20	Tu	Accession of Queen Victoria, 1837	3 44	8 18	8 51	10 33
21	W	Proclamation Day	3 44	8 18	9 55	10 53
22	Th	Sun sets 8h. 18m.	3 44	8 18	11 0	11 12
23	Fr	Cambridge Easter Term ends	3 45	8 19	After	11 31
24	Sa	St. John Baptist. Midsummer Day	3 46	8 19	1 11	11 52
25	S	**3 Sunday after Trinity**	3 46	8 19	2 17	Morn
26	M	George IV. died, 1830	3 46	8 18	3 25	0 17
27	Tu	Lord Clarendon died, 1870	3 46	8 18	4 33	0 44
28	W	Queen Victoria crowned, 1838	3 46	8 18	5 39	1 20
29	Th	*Liverpool Amateur Photo. Asso., and*	3 47	8 18	6 40	2 4
30	Fr	*[Oldham Photographic Society*	3 47	8 18	7 33	2 59

JULY.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	Sa	Battle of Boyne, 1690	3 48	8 18	8 18	4 6
2	S	4 Sunday after Trinity	3 49	8 17	8 55	5 21
3	M	Hungerford Market opened, 1833	3 50	8 17	9 25	6 41
4	Tu	*Sheffield Photographic Society*	3 51	8 16	9 51	8 3
5	W	*Bristol Amateur, and Benev. Asso.*	3 52	8 16	10 15	9 24
6	Th	*Bolton Photographic Society*	3 53	8 15	10 41	10 45
7	Fr	R. B. Sheridan died, 1816	3 54	8 15	11 5	After
8	Sa	Oxford Trinity Term ends	3 55	8 14	11 33	1 22
9	S	5 Sunday after Trinity	3 56	8 14	Morn	2 37
10	M	Calvin born, 1507	3 57	8 13	0 5	3 48
11	Tu	*Newcastle-on-Tyne Photo. Assoc.*	3 58	8 13	0 43	4 52
12	W	Crimea evacuated, 1856	3 59	8 12	1 30	5 49
13	Th	Marat assassinated, 1793	4 0	8 11	2 22	6 37
14	Fr	Bastile stormed, 1789	4 1	8 10	3 22	7 16
15	Sa	St. Swithin	4 2	8 9	4 26	7 48
16	S	6 Sunday after Trinity	4 3	8 8	5 33	8 15
17	M	Death for forgery abolished, 1837	4 4	8 7	6 38	8 37
18	Tu	Papal Infallibility declared, 1870	4 5	8 6	7 43	8 59
19	W	George IV. crowned, 1821	4 6	8 5	8 46	9 18
20	Th	Margaret V. and M.	4 7	8 4	9 52	9 38
21	Fr	Lord Derby born, 1816	4 9	8 3	10 57	9 57
22	Sa	St. Mary Magdalene	4 10	8 2	After	10 19
23	S	7 Sunday after Trinity	4 11	8 0	1 7	10 45
24	M	Gibraltar taken, 1704	4 12	7 58	2 14	11 16
25	Tu	St. James, Apostle	4 14	7 56	3 19	11 54
26	W	Sun rises 4h. 16m.	4 15	7 54	4 23	Morn
27	Th	*Liverpool Amateur Photo. Asso., and*	4 17	7 53	5 20	0 44
28	Fr	*[Oldham Photo. Soc.*	4 19	7 51	6 8	1 45
29	Sa	W. Wilberforce died, 1833	4 21	7 50	6 50	2 55
30	S	8 Sunday after Trinity	4 23	7 49	7 24	4 14
31	M	Sun sets 7h. 48m.	4 24	7 47	7 54	5 37

See pages cvi. & cvii.

AUGUST.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	Tu	*Sheffield Photographic Society*	4 25	7 46	8 19	7 1
2	W	*Bristol Amateur, and Benev. Asso.*	4 26	7 44	8 44	8 25
3	Th	*Bolton Photographic Society*	4 28	7 42	9 10	9 46
4	Fr	Conquest of Calais, 1347	4 30	7 41	9 37	11 7
5	Sa	First Telegram to America, 1858	4 31	7 40	10 9	After
6	S	9 Sunday after Trinity	4 33	7 38	10 46	1 38
7	M	Bank Holiday	4 35	7 36	11 29	2 46
8	Tu	*Newcastle-on-Tyne Photo. Assoc.*	4 36	7 34	Morn	3 44
9	W	Gun-cot. exp. at Stowmarket, 1871	4 38	7 32	0 21	4 35
10	Th	Greenwich Observatory foun., 1675	4 40	7 31	1 16	5 16
11	Fr	Dog days end	4 41	7 29	2 18	5 50
12	Sa	Grouse Shooting begins	4 42	7 27	3 21	6 18
13	S	10 Sunday after Trinity	4 44	7 25	4 27	6 43
14	M	Lord Clyde died, 1863	4 45	7 23	5 33	7 5
15	Tu	Sir Walter Scott born, 1771	4 46	7 21	6 37	7 26
16	W	Gas in London, 1807	4 47	7 19	7 40	7 44
17	Th	Duchess of Kent born, 1786	4 49	7 17	8 46	8 5
18	Fr	E. Russell b. 1792, d. May 28, 1878	4 51	7 15	9 50	8 25
19	Sa	Robert Bloomfield died, 1823	4 52	7 13	10 56	8 50
20	S	11 Sunday after Trinity	4 53	7 11	After	9 18
21	M	William IV. born, 1765	4 55	7 9	1 5	9 53
22	Tu	Battle of Bosworth, 1485	4 57	7 7	2 7	10 35
23	W	*British Association Meet. at South-*	4 59	7 5	3 5	11 29
24	Th	St. Bartholomew [*ampton*	5 1	7 3	3 57	Morn
25	Fr	Faraday died, 1867	5 2	7 1	4 41	0 34
26	Sa	Prince Albert born, 1819	5 3	6 59	5 18	1 45
27	S	12 Sunday after Trinity	5 5	6 57	5 50	3 5
28	M	Leigh Hunt died, 1859	5 7	6 55	6 19	4 29
29	Tu	St. John Baptist beheaded	5 8	6 53	6 45	5 54
30	W	Sun rises 5h. 11m. [*ham Pho. Soc.*	5 10	6 51	7 11	7 19
31	Th	*Liverpool Am. Photo. Asso., and Old-*	5 12	6 49	7 39	8 44

SEPTEMBER.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	Fr	Partridge Shooting begins	5 13	6 46	8 9	10 5
2	Sa	Sun rises 5h. 16m.	5 15	6 44	8 46	11 23
3	S	13 **Sunday after Trinity**	5 16	6 42	9 27	After
4	M	French Republic declared, 1870	5 18	6 40	10 17	1 38
5	Tu	*Sheffield Photographic Society*	5 20	6 37	11 12	2 31
6	W	*Bristol Amateur, and Benev. Asso.*	5 21	6 35	Morn	3 16
7	Th	*Bolton Photo. Society, and Glasgow*	5 23	6 32	0 12	3 52
8	Fr	[*Photo. Asso. (Ann. Meet.)*	5 25	6 29	1 16	4 23
9	Sa	Battle of Flodden, 1573	5 26	6 27	2 21	4 48
10	S	14 **Sunday after Trinity**	5 27	6 25	3 24	5 10
11	M	Assault on Delhi, 1857	5 29	6 22	4 30	5 32
12	Tu	*Newcastle-on-Tyne Photo. Assoc.*	5 31	6 20	5 31	5 51
13	W	Charles James Fox died, 1806	5 32	6 18	6 37	6 10
14	Th	*Manchester Photographic Society*	5 33	6 16	7 41	6 31
15	Fr	L'pool and Manch. Rail. op., 1830	5 35	6 14	8 46	6 54
16	Sa	P. O. Savings Banks opd., 1861	5 36	6 12	9 50	7 21
17	S	15 **Sun. after Trinity**	5 38	6 10	10 55	7 54
18	M	Dr. Johnson born, 1709	5 40	6 7	11 56	8 33
19	Tu	Bishop Patteson killed, 1701	5 42	6 5	After	9 21
20	W	Owen Glendower died, 1415	5 43	6 2	1 48	10 18
21	Th	Cleopatra's Needle left Alexandria,	5 45	6 0	2 33	11 26
22	Fr	Lord Denman died, 1854 [1877	5 46	5 58	3 12	Morn
23	Sa	Battle of Assaye, 1803	5 48	5 56	3 46	0 40
24	S	16 **Sun. after Trinity**	5 49	5 54	4 16	1 59
25	M	Siege of Paris, 1870	5 51	5 52	4 41	3 21
26	Tu	Cruikshank born, 1792	5 53	5 50	5 9	4 46
27	W	Algiers bombarded, 1816	5 55	5 47	5 37	6 11
28	Th	*Liverpool Amateur Photo. Asso., and*	5 56	5 45	6 7	7 35
29	Fr	[*Oldham Photographic Society*	5 58	5 43	6 42	8 57
30	Sa	St. Jerome	5 59	5 41	7 23	10 15

OCTOBER.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	**S**	17 Sun. after Trinity	6 1	5 40	8 10	11 24
2	M	*West Riding of Yorkshire Photo. Soc.*	6 3	5 38	9 5	After
3	Tu	*Sheffield Photo. Society [Ama.*	6 5	5 35	10 5	1 11
4	W	*Ben. As., Edin. Pho. Soc., & Bristol*	6 7	5 32	11 7	1 51
5	Th	*S. Lond. Photo. So., Bolton Photo. So.,*	6 9	5 30	Morn	2 23
6	Fr	*[Glasgow Photo. Ass., & Dundee Ass.*	6 10	5 27	0 13	2 52
7	Sa	Columbus discovd. Cuba, 1492	6 12	5 25	1 17	3 15
8	**S**	18 Sun. after Trinity	6 14	5 22	2 20	3 36
9	M	Cobbett died, 1856	6 16	5 20	3 24	3 57
10	Tu	*Newcastle-on-Tyne Photo. Assoc.*	6 17	5 18	4 28	4 17
11	W	Sun sets 5h. 15m.	6 19	5 15	5 33	4 37
12	Th	*Manchester Photo. Soc. (Ann. Meet.)*	6 20	5 13	6 37	4 59
13	Fr	*Photographic Society of Ireland*	6 22	5 11	7 42	5 26
14	Sa	Battle of Hastings, 1066	6 24	5 8	8 47	5 57
15	**S**	19 Sun. after Trinity	6 25	5 6	9 50	6 35
16	M	Houses of Parliament burnt, 1834	6 27	5 4	10 50	7 19
17	Tu	Ethelreda, V. Q.	6 28	5 2	11 43	8 12
18	W	Lotteries suppressed, 1826	6 30	5 0	After	9 15
19	Th	Dean Swift died, 1745	6 31	4 58	1 10	10 24
20	Fr	M. W. Balfe, composer, died, 1870	6 32	4 56	1 45	11 38
21	Sa	Battle of Trafalgar, 1805	6 34	4 54	2 13	Morn
22	**S**	20 Sun. after Trinity	6 36	4 52	2 41	0 56
23	M	Lord Derby died, 1869	6 38	4 50	3 6	2 18
24	Tu	Chaucer died, 1400	6 40	4 47	3 34	3 41
25	W	Sir J. Graham died, 1861	6 42	4 45	4 1	5 3
26	Th	*Liverpool Amateur Photo. Asso., and*	6 44	4 43	4 34	6 25
27	Fr	*[Oldham Photographic Society*	6 46	4 41	5 12	7 47
28	Sa	Balaklava Charge, 1854	6 48	4 39	5 59	9 1
29	**S**	21 Sun. after Trinity	6 50	4 37	6 51	10 7
30	M	Coal Exchange opd., 1849 [1845	6 51	4 36	7 51	11 3
31	Tu	Waghorn's first overland route,	6 53	4 34	8 54	11 47

NOVEMBER.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
		[and Photo. Benevolent Asso				
1	W	*Edin. Soc. (Ann. Meet.), Brist. Am.,*	6 56	4 32	9 59	0 23
2	Th	*South Lond. Photo. Soc., Bolton Photo.*	6 57	4 31	11 6	0 52
3	Fr	*[Soc. (Ann. Meet.), Glasgow Photo.*	6 59	4 29	Morn	1 19
4	Sa	*[Asso., and Dundee Photo. Asso.*	7 0	4 27	0 10	1 40
5	S	22 Sun. after Trinity	7 2	4 25	1 14	2 1
6	M	*W. Rid. of Yorks. Pho. So. (An. M.)*	7 4	4 24	2 17	2 21
7	Tu	*Sheffield Photo. Soc. (Ann. Meet.)*	7 5	4 23	3 22	2 42
8	W	*Cheltenham Amateur Photo. Soc.*	7 7	4 22	4 26	3 4
9	Th	*Manchester Photographic Society*	7 9	4 20	5 33	3 29
10	Fr	*Photo. Society of Ireland (An. Meet.)*	7 10	4 19	6 37	3 58
11	Sa	Martinmas Term (Scotland)	7 12	4 17	7 42	4 34
12	S	23 Sun. after Trinity	7 14	4 16	8 43	5 17
13	M	St. Brice	7 16	4 14	9 39	6 8
14	Tu	*Photo. Society of Great Britain, and*	7 18	4 12	10 28	7 9
15	W	*[Newcastle-on-Tyne Photo. Assoc.*	7 19	4 11	11 11	8 15
16	Th	John Bright born, 1811	7 21	4 10	11 47	9 27
17	Fr	Queen Elizabeth's Day	7 23	4 9	After	10 42
18	Sa	Duke of Wellington buried, 1852	7 25	4 8	0 44	11 59
19	S	24 Sun. after Trinity	7 27	4 7	1 9	Morn
20	M	Chatterton born, 1752	7 28	4 6	1 34	0 18
21	Tu	Crown Princess of Germany born,	7 30	4 4	1 59	2 37
22	W	St. Cecilia, V. and M. [1840	7 31	4 3	2 29	3 59
23	Th	St. Clement	7 33	4 2	3 3	5 19
24	Fr	John Knox died, 1574	7 34	4 0	3 46	6 36
25	Sa	Dr. Kitto died, 1854	7 36	3 58	4 34	7 47
26	S	25 Sun. after Trinity	7 37	3 57	5 32	8 49
27	M	Lord Selborne born, 1812 [1814	7 39	3 56	6 35	9 39
28	Tu	*The Times* first printed by steam,	7 40	3 55	7 41	10 21
29	W	Cardinal Wolsey died, 1530	7 42	3 55	8 49	10 54
30	Th	*L'pool Ama. Photo. Asso. (An. Meet.)*	7 44	3 54	9 56	11 21
		[and Oldham Pho. Soc. (Ann. Meet.)				

DECEMBER.

D M	D W	REMARKABLE DAYS.	SUN Rises. H. M.	SUN Sets. H. M.	MOON Rises. After.	MOON Sets. Morn.
1	Fr	Princess of Wales born, 1844	7 46	3 53	11 1	11 44
2	Sa	Sun rises 7h. 47m.	7 47	3 52	Morn	After
3	S	1 Sunday in Advent	7 48	3 52	0 4	0 26
4	M	*West Riding of Yorkshire Photo. Soc.*	7 49	3 51	1 8	0 45
5	Tu	*Sheffield Photo. Soc. [& Ben. Asso.*	7 51	3 51	2 13	1 7
6	W	*Edin. Photo. Soc., Bristol Amateur,*	7 52	3 51	3 18	1 30
7	Th	*South Lond. Soc. (Ann. Meet.), Bolton*	7 53	3 50	4 23	1 58
8	Fr	*[Soc., Glasgow Asso., & Dundee Asso.*	7 54	3 50	5 28	2 31
9	Sa	[8th—*Photo. Society of Ireland*	7 56	3 50	6 31	3 12
10	S	2 Sunday in Advent	7 57	3 49	7 32	4 0
11	M	*[on-Tyne Phot. Asso.*	7 58	3 49	8 25	4 58
12	Tu	*Pho. Soc. of Gt. Britain, & Newcastle-*	7 59	3 49	9 10	6 4
13	W	*Cheltenham Amateur Photo. Society*	8 0	3 49	9 49	7 16
14	Th	*Manchester Photographic Society*	8 0	3 49	10 22	8 32
15	Fr	Lady Beaconsfield died, 1872	8 1	3 49	10 50	9 50
16	Sa	Cambridge Michaelmas Term ends	8 2	3 49	11 15	11 7
17	S	3 Sunday in Advent	8 3	3 49	11 38	Morn
18	M	Oxford Michaelmas Term ends	8 4	3 50	After	0 24
19	Tu	J. M. Turner, painter, died, 1851	8 5	3 50	0 32	1 42
20	W	Explo. of powder mag. at Albania,	8 5	3 50	1 2	3 0
21	Th	Law Michaelm. Sittings end [1874	8 6	3 51	1 38	4 16
22	Fr	Archbp. of Canterbury born, 1811	8 6	3 51	2 23	5 28
23	Sa	Lord Romilly died, 1874	8 6	3 51	3 16	6 33
24	S	4 Sunday in Advent	8 7	3 52	4 18	7 28
25	M	Christmas Day.	8 7	3 53	5 22	8 14
26	Tu	Bank and general holiday	8 8	3 53	6 29	8 51
27	W	Sun rises 8h. 8m.	8 8	3 54	7 37	9 21
28	Th	*Oldham Photographic Society*	8 9	3 55	8 44	9 46
29	Fr	W. E. Gladstone born, 1809	8 9	3 56	9 50	10 9
30	S	St. Sylvester	8 9	3 57	10 53	10 32
31	S	1 Sunday after Christmas	8 9	3 58	11 58	10 51

PHASES OF THE MOON.

JANUARY.			FEBRUARY.		
Full Moon,	4,	10h. 59m. M.	Full Moon,	3,	5h. 58m. M.
Last Quarter,	12,	3h. 47m. A.	Last Quarter,	11,	8h. 34m. M.
New Moon,	19,	4h. 35m. A.	New Moon,	18,	2h. 50m. M.
First Quarter,	26,	7h. 45m. M.	First Quarter,	24,	9h. 31m. A.

PHOTOGRAPHIC SOCIETIES, &c.

Photographic Society of Great Britain.

FOUNDED 1853.

The Ordinary Meetings are held at the Gallery of the Royal Society of Painters in Water-Colours, 5A, Pall Mall East, at Eight o'clock p.m., on the second Tuesday of each month from November to June inclusive. Annual General Meeting on the second Tuesday in February. Extra Meetings, called "Technical Meetings," are held on the fourth Tuesday in each month.

COUNCIL AND OFFICERS.

President—James Glaisher, F.R.S., F.R.A.S.

Vice-Presidents—Capt. W. de W. Abney, R.E., F.R.S., J. H. Dallmeyer, F.R.A.S., T. Sebastian Davis, F.C.S.

Treasurer—John Spiller, F.C.S.

Council—Francis Bedford, W. Bedford, Charles Bennett, Walter S. Bird, Valentine Blanchard, W. B Bolton, T. M. Brownrigg, Lieut. L. Darwin, R.E., W. England, Jabez Hughes, Payne Jennings, Peter Mawdsley, H. B. Pritchard, F.C.S., H. P. Robinson, Prof. G. G. Stokes, M.A., D.C.L., F.R.S., Leon Warnerke, Col. H. Stuart Wortley, and F. York.

Hon. Secretary—Lieut. L. Darwin, R.E., Brompton Barracks, Chatham.

Assistant Secretary—Edwin Cocking, 57, Queen's Road, Peckham, S.E.

☞ At the Annual Meeting to be held in February a change will take place in the constitution of the Council, as a certain proportion of the members of that body retire annually, by rotation, and their successors will be appointed at the meeting in February.

South London Photographic Society.

ESTABLISHED 1859.

The Ordinary Meetings are held in the Rooms of the Society of Arts, John Street, Adelphi, at Eight o'clock p.m., on the first Thursday in each month, from January to June inclusive, and from October to December. Annual Meeting in December.

President—Rev. F. F. Statham, M A., F.G.S.

Vice-Presidents—Jabez Hughes, Frank Howard, W. Brooks, Peter Mawdsley, and Edwin Cocking.

Committee—T. Bolas, F.C.S., W. B. Bolton, A Cowan, W. Cobb, E. Dunmore, E. W. Foxlee, L. Warnerke, and G. F. Williams.

Honorary Treasurer—F. A. Bridge.

Secretary—H. Garrett Cocking, High Road, Lee, S.E.

PHASES OF THE MOON.

MARCH.			APRIL.		
Full Moon,	5,	0h. 40m. M.	Full Moon,	3,	5h. 47m. A.
Last Quarter,	12,	9h. 28m. A.	Last Quarter,	11,	6h. 30m. M.
New Moon,	19,	0h. 17m. A.	New Moon,	17,	9h. 38m. A.
First Quarter,	26,	1h. 33m. A.	First Quarter,	25,	6h. 56m. M.

Photographic Club.

ESTABLISHED 1879.

The Club meets every Wednesday evening, at Ashley's Hotel, Henrietta Street, Covent Garden, at Seven o'clock. One hour (Eight to Nine) is devoted to the discussion of technical business, and the remainder of the evening to social purposes.

Trustees—W. Ackland and F. York.

Committee—W. Bedford, T. Bolas, W. B. Bolton, W. Cobb, A. Cowan, Payne Jennings, Peter Mawdsley, G. F. Williams.

Treasurer—E. Dunmore. *Librarian*—T. J. Pearsall.

Hon. Secretary—C. G. Cutchey, 62, Gracechurch Street, E.C.

Assistant Hon. Secretary—C. B. Cutchey.

Amateur Photographic Field Club.

ESTABLISHED 1858.

Outdoor Meetings are held every month during the summer, beginning in April. Indoor meetings for discussion and exhibition of work are held during the winter. The Club is limited to twenty-five. One or two active amateur workers could be admitted. Particulars from the Hon. Secretary.

President—J. C. Andrea.

Hon. Secretary—W. Wainwright, Jun., Hoe Place, Woking.

Photographers' Benevolent Association.

ESTABLISHED 1873.

The Ordinary Meetings are held at the Offices, 181, Aldersgate Street, at Eight o'clock p.m., on the first Wednesday of each month.

Established to assist members, their wives, and children when in distress through sickness, death, or lack of employment, by means of immediate grants of money; to grant annual pensions to aged members; and to aid the unemployed members in obtaining situations. Subscriptions—Ordinary membership, quarterly, 3/-; half-yearly, 5/6; or yearly, 10/6. Honorary Subscriptions—One Guinea and upwards. Book of Rules post free, 6d.

Vice-Presidents—Rev. F. F. Statham, M.A., J. H. Dallmeyer, F.R.A.S.

Board of Management—W. S. Bird (Chairman), H. J. Thorne (Deputy-Chairman), W. M. Ashman, H. J. Burton, T. Bolas, C. G. Collins, J. A. B. Hall, J. O'Conner, A. Strivens, and R. E. Wilkinson.

Treasurer—H. Baden Pritchard, F.C.S., Royal Arsenal, Woolwich.

Secretary—Henry Harland, 181, Aldersgate Street, E.C., and 83, Hawkesley Road, Stoke Newington.

[*See Advertisement.*

PHASES OF THE MOON.

MAY.			JUNE.		
Full Moon,	3,	8h. 31m. M.	Full Moon,	1,	8h. 33m. A.
Last Quarter,	10,	0h. 35m. A.	Last Quarter,	8,	5h. 9m. A.
New Moon,	17,	7h. 33m. M.	New Moon,	15,	6h. 33m. A.
First Quarter,	25,	0h. 41m. M.	First Quarter,	23,	6h. 1m. A.

Manchester Photographic Society.

ESTABLISHED 1855.

The Ordinary Meetings are held at the Mechanics' Institution, at Seven o'clock p.m., on the second Thursday of each month, from September to May, inclusive. Annual Meeting on the second Thursday in October.

President—E. Leader Williams, M. Inst. C.E.

Vice-Presidents—The Rev. Canon Beechey, M.A., Alfred Brothers, F.R.A.S., John Chadwick, J. W. Leigh, A. Coventry.

Council—R. Atherton, W. Blakeley, T. Chilton, J. T. Chapman, S. D. McKellen, J. Pollitt, J. Schofield, J. Warburton, N. Wright, and James Young.

Hon. Treasurer—W. G. Coote.

Hon. Secretary—W. J. Chadwick, Prince's Bridge Iron Works, Manchester.

Glasgow Photographic Association.

ESTABLISHED 1862.

The Ordinary Meetings are held at the Religious Institution Rooms, 172, Buchanan Street, at Eight o'clock p.m., on the first Thursday of each month, from September to April. Annual Meeting first Thursday in September. Election Meeting last Thursday in April.

President—John Parker. *Vice-Presidents*—P. Ralston, T. Gilfillan.

Council—A. Bowman, J. J. Moran, W. Craig Ramsay, A. Robertson, John M. Skinner, and John Urie.

Treasurer—George Bell.

Secretary—John Y. McLellan, Blackhill House, Cumbernauld Road.

Edinburgh Photographic Society.

ESTABLISHED 1861.

The Ordinary Meetings are held at the Hall, 5, St. Andrew Square, at Eight o'clock p.m., on the first Wednesday of each month, excluding July, August, and September. Annual Meeting on the first Wednesday in Nov.

Patron—His Royal Highness the Duke of Edinburgh.

President—John Lessels. *Vice-Presidents*—Jas. Henderson, Jas. Howie.

Council—John Bertram, F. Briglmen, James Crighton, Wm. Dougall, Wm. Hume, James Jameson, G. G. Mitchell, Alex. Nicol, Thomas Pringle, Wm. Ranken, John Simpson, and Marshall Wane.

Hon. Treasurer—H. H. Pillans.

Hon. Secretary—M. G. Dobbie, 8, Rosehall Terrace, Newington.

Corresponding Secretary—W. T. Bashford, Argyle House, Portobello.

Lecturer—W. H. Davies. *Curator*—J. M. Turnbull. *Auditor*—A. T. Niven, C.A.

PHASES OF THE MOON.

JULY.			
Full Moon,	1,	6h.	8m. M.
Last Quarter,	7,	9h.	52m. A.
New Moon,	15,	7h.	1m. M.
First Quarter,	23,	10h.	18m. M.
Full Moon,	30,	2h.	2m. A.

AUGUST.			
Last Quarter,	6,	4h.	13m. M.
New Moon,	13,	9h.	10m. A.
First Quarter,	22,	0h.	55m. M.
Full Moon,	28,	9h.	19m. A.

Liverpool Amateur Photographic Association.

ESTABLISHED 1863.

The Ordinary Meetings are held at the Free Public Library and Museum, William Brown Street, at Six o'clock p.m., on the last Thursday in each month, with the exception of December. Annual Meeting on the 24th November.

President—E. Roberts.

Vice-Presidents—B. Boothroyd and J. W. H. Watling.

Council—K. Bean, T. W. Bruce, J. H. Day, J. H. T. Ellerbeck, G. A. Kenyon, M.D., W. H. Kirkby, E. Phipps, W. E. Potter, B. J. Sayce, H. A. Wharmby, and W. H. Wilson.

Treasurer—E. Twigge.

Hon. Secretary—Rev. H. J. Palmer, M.A., Clare Mount, Wallasey, Birkenhead.

Bristol and West of England Amateur Photographic Association.

RE-ESTABLISHED 1876.

The Ordinary Meetings are held at the Association Studio, Portland Street, Kingsdown, at Eight o'clock p.m., on the first Wednesday in each month. Annual Meeting on the first Wednesday in February.

President—Colonel T. Biggs.

Vice-Presidents—Rev. W. J. Whiting, M.A., and T. Davey.

Council—Colonel T. Biggs, Rev. W. J. Whiting, M.A., T. Davey, E. Brightman, H. A. H. Daniel, W. W. Boyden, P. Munro, C. Phipps Lucas.

Treasurer—Edward Brightman.

Hon. Secretary—H. A. H. Daniel, Avonmead, Leigh Rd., Clifton, Bristol.

West Riding of Yorkshire Photographic Society.

ESTABLISHED 1874.

The Ordinary Meetings are held at the Market Tavern Hotel, Godwin Street, Bradford, at half-past Seven o'clock p.m., on the first Monday in each month, except June, July, August, and September. Annual Meeting on the first Monday in November.

President—E. Passingham. *Vice-President*—J. Howarth.

Council—T. C. Bridges, R. Broadhead, J. Garatt, E. Greaves, E. T. Jenkins, T. Ledgard, J. S. Shaw, J. Smith, and E. Wormald.

Treasurer—T. Illingworth.

Secretary—J. Crosthwaite, 46, Great George Street, Leeds.

PHASES OF THE MOON.

SEPTEMBER.			OCTOBER.		
Last Quarter,	4,	1h. 26m. A.	Last Quarter,	4,	2h. 17m. M.
New Moon,	12,	0h. 59m. A.	New Moon,	12,	6h. 1m. M.
First Quarter,	20,	1h. 28m. A.	First Quarter,	19,	11h. 55m. A.
Full Moon,	27,	5h. 10m. M.	Full Moon,	26,	2h. 34m. A.

Cheltenham Amateur Photographic Society.

ESTABLISHED 1865.

The Ordinary Meetings are held at Eight o'clock p.m., on the second Wednesday in each month, from November to May. Annual Meeting on the second Wednesday in January. Excursions during the summer months.

President—Clifford E. F. Nash.

Committee—Messrs. Penny, B. Jones, and the Officers.

Treasurer—J. Bull. *Hon. Sec.*—W. C. Beetham, 22, Promenade Villas.

Oldham Photographic Society.

ESTABLISHED 1867.

The Ordinary Meetings are held at the Hare and Hounds Inn, Yorkshire Street, at Eight o'clock p.m., on the last Thursday in each month. Annual Meeting in November.

President—George Hall. *Vice-President*—John Risley.

Council—R. Dalton. John Fullalove, James Gartside, Sen., James Hall, E. Horsfall, T. Kershaw, and J. Mellalieu..

Treasurer—Jeremiah Green.

Secretary—Alfred Knott, 55, Yorkshire Street, Oldham.

Sheffield Photographic Society.

ESTABLISHED 1876.

The Ordinary Meetings are held at the Freemasons' Hall, Surrey Street, at half-past Seven o'clock p.m., on the first Tuesday in each month. Annual Meeting in November.

President—J. H. Morton, M.D.

Vice-Presidents—W. Dakin, J. D. Leader.

Council—Messrs. J. H. Rawson, G. V. Yates, and the Officers.

Treasurer—John Stringfellow.

Secretary—Joseph Taylor, Holland Place, London Road.

Bolton Photographic Society.

ESTABLISHED 1879.

The Ordinary Meetings are held at The Baths, at Eight o'clock p.m., on the first Thursday in each month. Annual Meeting first Thursday in Nov.

President—John Hick.

Vice-Presidents—Robt. Harwood, Thos. Parkinson.

Council—W. Banks, C. K. Dalton, R. Harwood, J. R. Haslam, J. W. Hawksworth, John Hick, W. Knowles, T. Parkinson, W. Rideout, J. Taylor, and P. Tong. *Treasurer*—Wm. Banks.

Secretary—Charles Kerfoot Dalton, 48. Higher Bridge Street.

PHASES OF THE MOON.

NOVEMBER.			DECEMBER.		
Last Quarter,	2,	6h. 58m. A.	Last Quarter,	2,	2h. 56m. A.
New Moon,	10,	11h. 20m. A.	New Moon,	10,	3h. 38m. A.
First Quarter,	18,	8h. 42m. M.	First Quarter,	17,	4h. 39m. A.
Full Moon,	25,	2h. 3m. M.	Full Moon,	24.	3h. 41m. A.

Dundee and East of Scotland Photographic Association.

ESTABLISHED 1880.

The Ordinary Meetings are held at Lamb's Hotel, Reform Street, at Eight o'clock p.m., on the first Thursday in each month, from October to April inclusive. Annual Meeting first Thursday in April.

Patron—The Earl of Strathmore. *President*—James C. Cox.

Vice-Presidents—W. D. Valentine and John Robertson.

Council—R. S. Baxter, A. Donald, H. G. Fraser, G. D. Macdougald, G. F. Roger, G. D. Valentine, A. Watt, and S. Rollo.

Hon. Treasurer—John Robertson.

Hon. Secretary—Charles Johnson, 43, Nethergate.

Photographic Society of Ireland.

ESTABLISHED 1879.

The Ordinary Meetings are held in the Royal College of Science, Dublin, on the second Friday in each month, except June, July, August, and September. Annual Meeting on the second Friday in November.

President—Dr. J. Emerson Reynolds, F.R.S.

Vice-President—Howard Grubb, F.R.A.S.

Council—Professor Barrett, F.R.C.S.E, Alex. Conan, Professor Hartley, F.R.A.S., J. E. Madden, George Mansfield, J.P., Thomas Mayne, T.C., Arthur Mayne, R.H.A., John V. Robinson, Dr. Charles R. C. Tichborne, and Joseph H. Woodworth.

Hon. Treasurer—Thomas Arthur Bewley.

Hon. Secretary—Alex. Conan, Roseneath, Sandymount Avenue, Dublin.

Newcastle-on-Tyne and Northern Counties' Photographic Association.

ESTABLISHED 1881.

The Ordinary Meetings are held at the College of Science, on the second Tuesday in each month, at half-past Seven o'clock. Annual Meeting in January.

President—J. W. Swan, F.C.S.

Vice-Presidents—Prof. Freire Marreco, M.A., Wm. Armstrong, Esq.

Treasurer—P. M. Laws.

Council—Dr. G. Berwick, L. Davison, Jas. Downey, Prof. A. Herschel, M.A., F.R.A.S., H. S. Mendelssohn, E. Sawyer, A. H. H. Steavenson.

Hon. Secretary—J. B. Payne, F.R.M.S., 13, Mosley Street, Newcastle.

Amateur Photographic Association.

ESTABLISHED 1861.

YORK HOUSE, YORK PLACE, LONDON, W.

President—His Royal Highness the Prince of Wales.

Vice-Presidents—His Grace the Archbishop of York, the Most Noble the Marquis of Drogheda, the Right Hon. the Earl of Caithness, F.R.S., the Right Hon. the Lord de Ros, the Right Hon. the Earl of Rosse, F.R.S.

Council—Sir Antonio Brady, A. Farre, M.D., F.R.S., &c., James Glaisher, F.R.S , F.R.A.S., &c.. J. D. Llewelyn, F.R.S., George Shadbolt, W. D. Howard, and Capt. J. C. A. Lewis, M.A. (*Cantab.*)

Referees—James Glaisher, F.R.S., F.R.A.S., W. D. Howard.

Hon. Secretary—A. J. Melhuish, F.R.A.S., F.M.S., York House, York Place, Portman Square, W.

British Association for the Advancement of Science.

ESTABLISHED 1831.

22, ALBEMARLE STREET, LONDON, W.

The next Annual Meeting will be held at Southampton, commencing August 23.

President—Sir John Lubbock, Bart., M.P., F.R.S., &c.

President-Elect—Dr. C. W. Siemens, F.R.S., &c.

Treasurer—Prof. A. W. Williamson, F.R.S.

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[*See other Testimonials, pages xix. to xxii.*

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[*See other Testimonials, pages xix.* to *xxii.*

SUMMARISED NOTES OF PROGRESS IN PHOTOGRAPHY DURING THE PAST YEAR.

By the Editor.

Whatever may be the general opinion as to the progressive character of the year 1881 in matters photographic, there can be no disputing the fact that the task of selecting and chronicling its notable events and occurrences is a more than usually difficult one. In saying this, I do not wish to imply that it has been a year of stagnation—far from it. The records in the journals show that at least the usual amount of energy has been displayed by experimentalists, and the character of the work which has appeared in the exhibitions sufficiently testifies that the practical workers have not been slow in applying the experience thus placed at their disposal.

It scarcely needs to be said that the all-pervading feature of the year has been the gradual spread of gelatino-bromide plates in every direction—not in this country merely, but in every portion of the globe. The gradual improvement in our knowledge of the working of dry plates, and the removal one by one of the difficulties which have hitherto formed stumbling-blocks, have, at length, firmly established the new order of things in many studios where previously the experimental stage had scarcely been passed.

Amongst the details of the process which have received special attention during the year may be mentioned the important operation of development; and, thanks to the published experience of some of the leading dry-plate workers—including Mr. W. K. Burton, Colonel Wortley, and Captain Abney—much new light has been thrown upon what has hitherto been considered a difficult and somewhat uncertain process. Closely allied to development is intensification; and here, again, a considerable amount of labour has been expended. In the earliest days of the practice of gelatine the necessity was felt for a suitable means of strengthening the sadly too numerous negatives which, from over-exposure or other causes, were deficient in density. The various methods of mercurial intensification—which, so far as collodion negatives are concerned, had almost lapsed into oblivion—were resuscitated and many new ones added; but there is too much reason to fear that those who have placed implicit faith in the permanence of their negatives so treated have had bitter cause to regret what must be called their misplaced confidence. From mercurial back to silver intensification, it has been attempted to show, is an easy and a desirable change, and very plain instructions have been published for working the latter method.

Those who will look back at their gelatine negatives of two years ago, will probably find amongst them many which, though they satisfied at the time, and possibly printed in a tolerably respectable manner, would at the present day be rejected. It came to be accepted as a part and parcel of a gelatine negative that it should be entirely different

from a collodion one. In place of the clear glass shadows of the latter it was customary to accept the dull, smoky-coloured films which were supposed to be a necessity with gelatine. It has been proved, however, that not only are such fogged or veiled images not a necessity in gelatine negatives, but that if accidentally such a result should be obtained it may in the majority of cases be entirely removed. For this purpose alum—mixed according to different operators with various substances—has come into general use, and plays a by no means unimportant part in the photographic laboratory.

In the department of emulsion making nothing very striking has occurred during the year. Dr. G. A. Kenyon has shown that it is possible to conduct the principal portion of the operations necessary in ordinary daylight if the emulsion be subsequently treated with bichromate of potash. Mr. W. K. Burton and others have endeavoured to simplify the process of freeing the emulsion from soluble salts; and considerable discussion has taken place with regard to the value or otherwise of silver iodide in the emulsion.

Mr. L. Warnerke has discovered a new fact in connection with gelatino-bromide plates, and one which he hopes to apply usefully in different ways. He has found that the film, after exposure and development with pyro. and ammonia, becomes insoluble in proportion to the extent of the combined action of the light and developer. Utilising this fact he proposes to apply it to various purposes, including not only the production of negatives but also photoglyptic moulds.

Mr. W. B. Woodbury has made a still further improvement on his process of printing in permanent colour, to which he has given the name of "Stannotype;" but it is not yet worked in this country. It consists in making a gelatine relief in the ordinary way as for Woodburytype printing, using a positive instead of a negative, so as to produce a reversed relief. This, when dry, is "faced" with tinfoil and used as the printing matrix, dispensing entirely with the costly hydraulic press and other machinery. The process is thus so simplified as to be brought within the reach of any ordinary photographer.

Amongst the scientific events of the year must be classed the appearance of at least two comets, one of which has been successfully photographed by Dr. Huggins, Dr. Draper, and others.

Electric lighting is gradually working its way into use as an auxiliary in portraiture, and the recent inventions of M. Faure, enabling electrical force to be stored for use, promise to render its employment more general.

We have to record the formation of two new societies, namely, the Newcastle-on-Tyne and Northern Counties' Photographic Association and the North Wales Amateur Photographic Society.

Besides the ordinary annual exhibitions of the Photographic Society of Great Britain and the Royal Cornwall Polytechnic Society, there have been exhibitions at Manchester and Newcastle; and within a few weeks of the appearance of these lines three more are announced—one under the auspices of the Society of Arts, another at Dundee, and the third at Sheffield.

Amongst those removed by death during the past year we have to regret the loss of Messrs. J. R. Johnson, M. Noton, Adam-Salomon, S. R. Lock, and R. W. Thomas—all well-known names in connection with the past history of photography.

THE COMPARATIVE SENSITIVENESS OF THE SILVER HALOIDS IN GELATINE EMULSION.

By the Editor.

Every employer of gelatino-bromide dry plates—whether he be also a manufacturer or not—must have experienced more or less trouble at times from serious variations in the sensitiveness of his plates. The difficulty is not of so much importance when it arises in changing from one make of plate to another, as then some difference might be anticipated and provided for; but when the plates from the same maker—nay, even from the same box—are found sometimes to vary to the extent of from twenty to fifty per cent., as it has been alleged, the want of uniformity is so great as to render the employment of dry plates, with any degree of certainty, impossible.

The mere user of the plates recognises this trouble, but goes no further. If the question should arise in his mind as to the cause, he is content to attribute it, in some indefinite way, to the length of time allowed in "cooking," and troubles himself no further with theoretical considerations. The manufacturer of plates, however—be he amateur or professional—will look at the matter from another point of view. His object will be to discover why this or that sample of emulsion is more or less sensitive than another. Experience will soon teach him that, when working under apparently-identical conditions as to formula and manipulations, widely-different results may be produced by accidental circumstances of so trivial a character that they may altogether escape observation; such, for instance—as pointed out in a recent article in The British Journal of Photography—as the variation of pressure when the emulsion is boiled in an open or closed vessel respectively. Indeed, as stated in the article referred to, different operators working the same formula—the same process—obtain approximatively similar degrees of sensitiveness in boiling, some for a few minutes only, others for hours.

If the same formula will thus give such varying results, it is not surprising that even greater divergences of character are produced when the formula is altered by the introduction of new salts, such as the iodide and chloride of silver; but it is not so easily explainable how one variation in the formula will give apparently opposite results in different hands. Thus, there has been considerable discussion during the past twelve months on the subject of iodide of silver in gelatine emulsion. Most experimentalists have agreed that the presence of iodide in even the most minute quantities confers on the emulsion distinctly new characteristics physically, such changes being entirely out of proportion to the quantity of the iodide used. But it is on the question as to whether the addition of an extremely-minute quantity of iodide necessarily causes a loss of sensitiveness that the various experimentalists have differed. I use the word "necessarily" because it has been alleged distinctly that an emulsion containing iodide is incapable of being rendered as sensitive as one composed of bromide only by any possible means—a statement which it has been attempted to prove is scarcely well founded. It has been found that, though a simply bromised emulsion submitted to any identical course of treatment in

sensitising and cooking may be a little quicker in its action than one in which a small trace of iodide has been introduced, yet it is possible, by prolonging the cooking of the latter, that its sensitiveness may be progressively increased, and that the iodide confers on the emulsion the power of withstanding a proportionately-longer cooking than the plain bromide will permit; that, in fact, supposing the degree of sensitiveness obtainable in either case to be limited only by the setting in of the fogging tendency produced by heat, and that with a given period of "stewing," the bromide will be more sensitive than the bromo-iodide, the stage at which this tendency supervenes in the latter case is so far delayed that the deficiency in sensitiveness is compensated for by the greater length of digestion. A similar result is produced in a bromide emulsion by the addition of a small quantity of acid, while ammonia under the same circumstances produces an opposite result. The action of acid, while it retards the change of the silver bromide into the sensitive form, also arrests the tendency to fog; and so, as in the case of iodide, the slowing action is compensated for by a corresponding increase of fog-restraining power, and the consequent capability of increased cooking.

If we consider the advantages that are claimed for the addition of iodide, it can scarcely be urged that a slight increase in the time occupied in the attainment of a certain degree of sensitiveness is too high a price to pay for the benefit derived. First, then, there is the action which the iodide exerts on the film in preventing blurring or halation. This it effects by the increased opacity it confers on the film and also the more non-actinic colour it imparts, as well, no doubt, as by the mechanical action it exerts in preventing the "lateral spread" of the image by the separation of the fine particles of bromide. Again: there is the wonderful boon it confers upon all in enabling, as Captain Abney has pointed out, a greater amount of light to be used in the developing room; but this has been seized upon by the opponents of iodide as *proof* that it must necessarily decrease the sensitiveness. But facts culled from other directions rather tend to prove this a *non sequitur;* for it was only when films of pure bromide of silver came to be used that the necessity for the very dense and uncomfortable illumination we are now too familiar with came to be recognised. It will be within the recollection of many amateurs or dry-plate workers whose experience dates back as far as the introduction of these simply bromised films—whether prepared by the bath or from an emulsion—that the light which was quite safe with a wet plate would hopelessly fog a dry bromide plate many times less sensitive. I myself, in my early wet-plate days, used the unprotected light of an ordinary candle to develope by, the distance from the light to the plate being not more than four feet. But collodio-bromide plates would not stand that form of treatment, though for camera purposes they might be twenty or thirty times slower. A more recent instance of this difference came under my notice three or four years ago. The manager of the enlarging department in a high-class business in the north of England desired to adopt collodion emulsion in place of wet collodion for the production of his enlargements on opal. I gave him what verbal advice I could, and he obtained two different samples of commercial washed emulsion and set to work. His productions were anything but satisfactory—thin, weak,

foggy, and all that was undesirable, especially in an opal picture. I suggested that he had, perhaps, let light get to the plates; but he was quite certain that that at least was not the cause of his failure—"it was *the emulsion.*" I undertook to try a sample of the latter, and gave him a perfectly clean and vigorous—if not a very pleasing toned—opal as the result, and was then begged to go and show him how to work it "in his own place." Then the mystery was out. A plate was brought in the slide from the dark room and exposed for eight minutes, the lime-light being used; we proceeded to the dark (?) room, and I was to develope the plate. The solutions were mixed, bottles placed in position, so that I could put my hand on them in the dark, or, at least, in the dim light I was then in the habit of using, and I gave the order to "turn down the gas." "Turn down the gas!" was the reply. "How are you going to see to develope?" "Well," I said, "surely you have some coloured lamp or something of that sort to develope by?" No, he developed by the gaslight! with a large fish-tail burner turned down half way, at a distance of six or seven feet from the sink. It was difficult to convince him that the light could be at fault when a wet plate that only required ninety seconds' exposure, under similar circumstances to those detailed above, would bear it without danger; and it was only after exposing a wet and an emulsion plate side by side for a short time, with one half of each protected, that his scepticism disappeared.

Now, if this be the case in connection with collodion, why should gelatine differ? Is it reasonable to argue that the presence of even a *slight* trace of iodide must necessarily slow a gelatine plate, or that the fact of such a plate bearing a stronger light without fogging proves that it is slower than a pure bromide plate? I think not. The fact is, the conditions of light in the dark room and in the camera are quite different. The light which comes from a bright summer sky is rich in those rays which act most energetically on silver iodide, and therefore the plate containing iodide gets the full advantage. In the dark room as ordinarily used there is, or ought to be, an entire absence of the rays which affect iodide, though bromide of silver is sensitive to the whole of the visible red rays, and hence is acted upon by even the weakest light we can employ. This is sufficient to explain the possibility of a plate containing iodide being relatively less sensitive than a bromide plate in the dark room, while the two may be equal in the camera.

Another advantage claimed for the addition of iodide is that it confers upon the plate the power of giving a wider range of tones between the high lights and shadows. This may or may not be absolutely the case. We certainly meet with very great variations in this respect in plates which are known to contain only pure bromide; so that it is as likely as not that the effect is due to other causes. At least, however, it is pretty generally agreed that a wide range of tones is more easily obtained with a plate containing iodide than with one of bromide alone.

Having said so much on the subject of iodide, it may be worth turning our attention to silver chloride, which has as yet come but little into use in connection with gelatine emulsions. Those of our readers whose dry-plate experience extends as far back as ten years ago will recollect that the first application of silver chloride in dry plates was in connection with the collodion emulsion process of Mr. M. Carey Lea, known

as the "chloro-bromide process." The bromide and chloride were subsequently combined with iodide in the chlor-iodo-bromide process of the same gentleman. As with silver iodide in gelatine emulsion, so with chloride in collodion; its introduction was met by considerable opposition, and it was alleged to be not only useless but actually injurious. But certain it is that some dry-plate workers in this country produced very high-class results with Mr. Lea's chloro-bromide process, securing by the use of chloride a far higher degree of sensitiveness than had hitherto been obtained. The opponents of the innovation alleged, however, that from the facility with which silver chloride is reduced without previous exposure to the light it would be found to produce nothing but general fog, and so, perhaps, if used in large proportion and under ordinary conditions of development it might do; but it remains true that in Mr. Lea's process no such effect ensued.

A word as to the adaptability of iodide and chloride of siver to alkaline or "chemical" development. To Major Russell we are mainly indebted for our earliest knowledge of the wonderful power obtainable with pure silver bromide and alkaline pyro. development, and the result of experiments carried on twenty years ago or more led to the view that bromide alone was capable of such development, iodide ranging itself on one side as unreducible, and chloride on the other as reducible without previous action of light. But there has been reason to considerably modify these views more recently. To Mr. Carey Lea we are indebted for first pointing out that iodide of silver contained in a collodion film is capable of development by means of alkaline pyro., though it was found to resist solutions of ordinary degrees of alkalinity; a powerful solution of caustic potash combined with pyrogallic acid caused it to succumb. To Mr. Herbert B. Berkeley is also due the credit of having demonstrated—now some years ago—the possibility of satisfactorily developing films of gelatino-chloride of silver; and though, so far, neither iodide nor chloride has been employed alone, either in collodion or gelatine, for the production of a developed image, there is little reason to doubt that each may play an important part under the action of the developer when combined with a large proportion of bromide.

One other point in connection with iodide I may touch upon in passing. It has been stated above that Mr. Carey Lea has pointed out that iodide of silver is capable of producing a developed image under the action of a powerfully-alkaline developer. This observation was made in the days of collodion emulsion, and, if I remember rightly, the experiments were made with a film of iodide of silver embedded in collodion, though of this I am not certain. Possibly paper impregnated with iodide of silver may have been used, but certainly not gelatine. In any case, the ordinary developer employed in those days was far more feebly alkaline than that employed for our modern gelatine plates, which are capable of withstanding the action of a far larger proportion of ammonia than any collodion dry plates. It is quite possible, then, that under the action of the stronger alkaline solutions of the present day iodide plays something more than a mechanical part in the films, and is not, as is generally supposed, *inert* to chemical development.

Sufficient has been said to show that there is at least some interest attached to other salts of silver than the bromide, and with this impression on my mind, and in view of the very different opinions expressed

by the various authorities, I commenced upwards of twelve months ago a series of comparative experiments in order to satisfy myself at least on the question of comparative sensitiveness. My experiments were relinquished for some time, but have been recently resumed; and it is proposed to give here the result of one series bearing upon the relative sensitiveness of plain bromide films and those containing a definite proportion each of iodide and of chloride, as well as a mixture of the three haloids. It should be borne in mind that the proportions which I adopted in my experiments are not supposed to form the best combinations possible either in sensitiveness or other properties; but the formulæ are calculated so as to form a series in which definite quantities of soluble iodide and chloride are substituted for their equivalents of bromide, the quantity of silver remaining the same throughout. The proportion of iodide used is very slightly under that recommended by Captain Abney. It may be noted that the fractional parts of grains ntroduced are for the purpose of, as far as possible, eliminating any un-ertainty which might arise from varying excesses of soluble haloid in he finished emulsions. As the formulæ now stand the widest difference etween any two would be compensated for by less than one-fifth of a grain of silver nitrate in the quantities given.

The question next arose as to how the greatest possible uniformity vas to be obtained in making the emulsion, *i.e.*, to secure the greatest egularity in the effect produced by the "cooking." In the earlier ex-eriments, in which the boiling plan was adopted, it was quite impos-ible to produce identically the same result with two batches made by he same formula; it was even found that if an emulsion after mixing vas divided into two portions and simultaneously boiled for the same ength of time in separate bottles but in the same cooking arrangement, he final results were not identical. On the publication of the suggestion o employ cold emulsification this was tried, and if it did not give abso-ute uniformity it at anyrate approached nearer to that standard, and was, herefore, adopted in the experiments to be detailed. The subsequent perations of washing and redissolving the emulsion were conducted as losely as possible on the same lines. After the addition of the full uantity of gelatine the emulsion was allowed to set, was then squeezed rough a washing syringe into distilled water, and washed until every ace of soluble matter had disappeared. Next, it was remelted and e plates coated at once in order to reduce to a minimum the chance of nsitiveness increasing by keeping in the emulsion state. The plates hen dry were stored away until the whole series were ready for use.

Four separate emulsions were made according to the following rmulæ, the silver being added to the salted gelatine (both solutions ing at as near boiling point as possible) by means of a funnel fitted ith a tube drawn to a point. The same funnel and tube were used in ery case, and thus the mixing of the emulsion and formation of the ver salt took place under as nearly as possible identical conditions. all the formulæ the quantities of water, gelatine, and silver nitrate ed are identical throughout, only the soluble haloids being varied.

A.

Ammonium bromide	72 grains.	Silver nitrate, 120 grains.
Gelatine	10 ,,	Distilled water, ½ ounce.
Distilled water	4 ounces.	

B.

Ammonium bromide......	$68\frac{1}{2}$ grains.	Silver nitrate, 120 grains. Distilled water, $\frac{1}{2}$ ounce.
,, iodide	5 ,,	
Gelatine	10 ,,	
Distilled water	4 ounces.	

C.

Ammonium bromide......	$62\frac{3}{4}$ grains.	Silver nitrate, 120 grains. Distilled water, $\frac{1}{2}$ ounce.
,, chloride......	5 ,,	
Gelatine	10 ,,	
Distilled water	4 ounces.	

D.

Ammonium bromide......	$59\frac{1}{2}$ grains.	Silver nitrate, 120 grains. Distilled water, $\frac{1}{2}$ ounce.
,, iodide	5 ,,	
,, chloride......	5 ,,	
Gelatine	10 ,,	
Distilled water	4 ounces.	

To the dissolved gelatine in each case, before adding the silver, two *drops* (in each case from the same dropping-tube) of dilute hydrochloric acid (1 : 5) were added. After mixing, the emulsion, now measuring four and a-half ounces, was transferred to bottles, well shaken, and set aside in a dark cupboard. At the end of twenty-four hours an ounce and a-half of emulsion was measured off from each bottle, forty grains of dry gelatine placed to soak in each for a short time, and then the whole warmed to about 100° to effect solution of the new gelatine, when they were allowed to set, washed, &c., in the ordinary way. At the end of forty-eight hours the same operations were gone through with another ounce and a-half of each, and at the end of seventy-two hours, or three days, the remainder was so treated. After washing and redissolving each batch was made up to two ounces.

In this manner twelve separate batches of emulsion were obtained, and in order to identify them they were marked as below, and will be so spoken of in the subsequent portion of this article.

	Bromide.	Bromo-iodide.	Bromo-chloride.	Bromiodo-chloride.
24 hours' emulsification	A^1	B^1	C^1	D^1
48 ,, ,,	A^2	B^2	C^2	D^2
72 ,, ,,	A^3	B^3	C^3	D^3

The emulsion was spread upon $7\frac{1}{2} \times 5$ plates, as these cut up conveniently each into six pieces $2\frac{1}{2} \times 2\frac{1}{2}$—the size used—which just covers the twenty-five tints on Warnerke's sensitometer screen.

The next matter to be considered was the method of testing the plates, and in the present unsettled state of the "standard light" question this appeared to offer many difficulties. I tried first of all the phosphorescent tablet recommended by Mr. Warnerke, but could not satisfy myself that it was uniformly reliable. Whether from variations in its power of saturation at different times or from slight inaccuracies in timing the separate exposures, I found discrepancies in the results obtained which I could not attribute to the plates themselves. I therefore concluded that simultaneous exposure of the plates to be tested to a light which, if not of a standard character was at least tolerably uniform, would give more trustworthy results, inasmuch as the plates used in each experiment would be submitted to the same amount of action.

I therefore adopted a gas jet fitted with a "regulating burner," and as my trials were usually made at about the same time of the day the pressure would no doubt be pretty uniform. As a means of graduating the exposure into "tints," I could think of no better plan than the Warnerke sensitometer screen. Four of these were selected, and after testing them for uniformity they were placed side by side in an $8\frac{1}{2} \times 6\frac{1}{2}$ printing-frame. The gas jet was arranged at a distance of eight feet from the printing-frame, and at such a height as to be exactly opposite the centre of the frame when the latter was in position for exposure. By this arrangement practically the same amount of light may be considered to have acted upon every portion of the surface of the four screens.

The development of each batch of plates (four being exposed at once) was conducted in a dish large enough to hold the lot. The developer employed was ferrous oxalate, made as follows:—

A.

Ferrous sulphate	4 ounces.
Distilled water	16 ,,

B.

Neutral potass oxalate	4 ounces.
Distilled water	16 ,,

One part of A was added to three parts of B shortly before using. It may be noted that this is not a powerful developer—that is, not so energetic as that made from the saturated solutions; but the weaker solutions appear more likely to give uniform action than the stronger ones. The proportion of potassic oxalate to ferrous sulphate is also larger than in the case of saturated solutions, and this excess acts as a restrainer and keeps the plates clean during development without the addition of bromide.

Such were the arrangements adopted, and though the results derived from them may not be actually comparable with the sensitometer experiments of others carried out in a different manner, it must be remembered that the object in this case was to secure the greatest possible uniformity in my own trials; and failing, as yet, any thoroughly-recognised standard, I was compelled to form one of my own. With regard to that standard, I may say that under the conditions I have stated above, plates made by formula A (*i.e.*, plain bromide) and the emulsion boiled for half-an-hour in the ordinary way gave No. 16 on the sensitometer; or, in other words, were nearly equal to the same formula with cold emulsification for forty-eight hours.

One feature not directly connected with these experiments may be noted, namely, that when using the phosphorescent tablet the plates containing iodide showed a higher degree of sensitiveness as compared with the others than when using gaslight.

I will now proceed to give the results obtained with the different plates, premising that, as tabulated further on, the figures are not the outcome of a single experiment; these were repeated at different times and compared. When any discrepancy arose the experiments with the plate or plates which appeared to be behaving abnormally were repeated until the cause was discovered. In some few instances in the following table a higher figure was reached in some of the trials, but so faintly impressed that it was considered to be due to acci dental causes

Twenty-four Hours' Emulsification.—A plate from each batch, allowed to emulsify for the shortest period, was placed behind its screen in the printing-frame, exposed, and developed with the following result:—

	A^1	B^1	C^1	D^1
Number of tint	13	10	13	13

Here it will be seen that while A, C, and D were practically equal, B, containing bromide and iodide, was very much inferior. On A the successive tints followed one another by regular steps, each one being distinct when the plate was examined by reflected light. The same may be said of B^1, but the general effect was more vigorous and the colour blacker. The lower tints—1, 2, and 3—presented greater contrast to one another than on A. In C the two first tints were nearly indistinguishable—in one or two cases quite so—and there was generally less contrast between the tints by reflected light. On looking through the plate, however, the density was greater than in A, and the contrasts as strongly marked. D presented less surface contrast and vigour than B, but more than A and C. The density by transmitted light was about equal to C, with stronger contrast. Of this lot perhaps B was the best, except for its insensitiveness, and D next.

Forty-eight Hours' Emulsification.—The results obtained with this batch of plates were as follow:—

	A^2	B^2	C^2	D^2
Number of tints	17	13	18	17

Here C was the most rapid, A and D being again equal, and B still the slowest, though in the extra emulsification it had gained the same degree of sensitiveness as A, C, and D in the previous lot. The different images retained the same relative characteristics; in A and C several of the earlier tints were merged into one another by reflected light, though quite distinct when viewed as negatives, C giving the denser image and about the same amount of contrast. In B and D the different tints remained perfectly distinct by reflected light, especially in the former, which also showed the stronger contrasts when looked through. Here C was decidedly most sensitive; but, leaving that out of the question, the order of quality was D, C, A, B, the last being too dense in the first tints to give promise of making soft negatives.

Seventy-two Hours' Emulsification.—The trial of the third batch of emulsions gave the following numbers:—

	A^3	B^3	C^3	D^3
Number of tints...............	18	17	21	20

Still C retained the premier place in sensitiveness, but both it and A showed palpable signs of having passed their zenith. It must not be supposed that this implies that they were spoilt by over-emulsification. It should be borne in mind that time development was used, and that probably had these two plates been taken out when the best result was reached they would have compared in quality with the other two. B still remained last in sensitiveness, while D had passed A, and both these showed their capability of withstanding longer cooking, no doubt with further benefit to their sensitiveness. D gave the best quality of image, B next; but, as has been suggested, the remaining two were probably over-developed.

The following table shows the comparative sensitiveness of the whole series:—

	A.	B.	C.	D.
1	13	10	13	13
2	17	13	18	17
3	18	16 or 17	21	20

A glance at this will show that there are several plates which are equal in sensitiveness to others; accordingly, to test the accuracy of the figures, I exposed these corresponding plates side by side under the standard conditions, and obtained, except in one instance, direct corroboration of my previous results. Thus, A^1, C^1, D^1, and B^2 all answered to the figures against them, as also did C^2 and A^3. But when A^2, D^2, and B^3 were tried together the last was manifestly inferior, for while the number seventeen was out on the other two long before the finish of the development, it could barely be discovered on B at the finish.

The result of these trials is in my mind to prove that, *cœteris paribus*, the addition of iodide to bromide does slow it, while chloride produces an opposite effect. On the other hand, it is shown very plainly that by prolonging the emulsification the sensitiveness of the bromo-iodide plate goes on increasing, but to what extent these experiments are insufficient to prove. Thus, the fact that the bromo-iodide plate of two days' cooking has caught the bromide plate of one day, and, again, the bromo-iodide of seventy-two hours has, nearly (if not quite) attained the same degree of sensitiveness as the forty-eight hours' bromide, clearly demolishes the theory that iodide must *necessarily* "slow" a plate. Then, again, take the fact that, when iodide is added in conjunction with chloride to the bromide, the relative sensitiveness of the plain bromide and the mixture remain the same up to a certain point, and then the bromiodo-chloride becomes the more sensitive. This, I think, points in an important direction. If with a given period of emulsification the bromiodo-chloride emulsion has attained a higher degree of sensitiveness than the plain bromide, and shows signs of being able to go on increasing its rapidity while the bromide has about exhausted its powers in that respect, then we may look for the increase in the rapidity of our plates in the future to the compound emulsion; and in doing so we shall probably not find any falling off in their quality, but very likely the reverse.

As I said in the earlier part of this article, the proportions of bromide, iodide, and chloride given are probably far from the best. A line of experiment is opened, however, and by playing off the iodide against the chloride in such proportions as will best suffice to neutralise their respective faults, while securing in the highest degree their good qualities, we shall probably some day reach the highest standard of excellence in gelatine plates. I have used bromo-chloride and bromiodo-chloride plates for more than two years, but have never to any great extent varied my formula. The one which has satisfied me is almost identical with that marked above as D.

LENSES HAVING MANY FOCI.

By J. Traill Taylor (New York).

Two years have elapsed since, owing to the more general utilisation of sensitive gelatine plates, I wrote for the 1880 issue of this Almanac a

plea for the employment of single achromatic lenses for portraiture, and I am glad to find that the sentiments I then expressed are being re-echoed. Without recapitulating what I then wrote I may briefly say that it had reference to the great value of the front lens of a portrait combination for producing large pictures when used in a certain manner specified.

Since the time just mentioned I have been pursuing the same line of research, viz., the utilising of lenses possessing a somewhat small angular aperture—and consequently great penetrative power—for portraiture. After many experiments I find that, by a modification, an old and but little-used combination—the *orthoscopic*, or *orthographic*—may be made to fulfil several desired conditions in the portrait gallery.

For the benefit of those who have but lately entered the field of photography I may explain that the orthoscopic lens is an objective having a front achromatic combination similar to that of the portrait lens, but the back combination of which, although achromatic, is negative or diminishing. Thus, whereas the posterior combination of the portrait objective shortens the focus, that of the orthoscopic objective lengthens it. The older readers of THE BRITISH JOURNAL OF PHOTOGRAPHY may remember that, in 1864, I devised and exhibited before the Photographic Society of Scotland a lens of the orthoscopic *genus*, in which, by the sliding backwards or forwards of a tiny projecting button in a slot in the tube, it was possible to obtain either absolute sharpness of definition, or that quality popularly designated "depth of focus," which gives definition of a diminished although still pictorial sharpness.

In the course of conducting the experiments which led to this result I had made a number of back combinations of the same diameter, but varying in form and focus—all, however, to work along with one front combination, which was that of an ordinary portrait objective; and I soon realised that with a few (say three or four) of these negative back combinations, and which, fortunately, can be made at a very low price, a photographer could greatly increase the capabilities of his objective, the focal range at disposal extending from little, if anything, beyond that of the front lens alone to two or three times that amount. Soon after these experiments had been made the whole thing was laid aside in favour of other pursuits; but after the introduction of gelatine plates possessing a high degree of sensitiveness I reconstructed the lens, and found it to place a great power in the hands of the photographer.

The front lens of any objective is, it has been said, the image former, the others being merely modifiers of the image thus formed. This applies to photographic objectives as well as to others, and when the anterior combination is really a good one it is astonishing what a degree of elasticity it permits in the posterior. For example: Morrison's wide-angle lens, which has obtained great popularity in America, works equally well with an achromatic as with a non-achromatic back lens, the front being composed of a somewhat deep achromatic meniscus. The back is a plain, non-achromatic meniscus; and what I direct attention to is this—that the function of the perfectly-actinised front is not affected by the plain back. At a future time I will inform the readers of THE BRITISH JOURNAL OF PHOTOGRAPHY of the important uses to which I have put a realisation of the fact just mentioned.

As any optician well knows, a very slight difference in the focus of a negative combination, like the posterior of the orthoscopic objective, produces a great difference in the combined focus. In two such negative combinations now before me, and between which it is difficult to discover any difference by the unaided eye, the power exercised upon the objective is such as to render it one of either eighteen inches or twenty-five inches focus, according as to which combination is inserted. In either case the definition is of a high order, and the field of delineation large and possessing the requisite degree of flatness.

The practical application of this is the possibility of employing for portraiture, when the plates are extremely sensitive, a lens which is capable of making either a large or a small image at will, and that in an optically-perfect manner. I have hinted that the orthoscopic addendum to a lens is not necessarily expensive. I have at anyrate found this in my own experience, and in a lens which I have somewhat roughly constructed I can, by dropping in one or other of a set of such back elements, obtain any focus I desire between the ranges. A small lens which for several years rendered good service as one of fourteen and a-half inches focus has lately been doing equally effective service as one of forty inches, the images of external nature thus produced being of telescopic dimensions. The objective in question is short, as regards length of tube ; it has a nearly plano-convex achromatic in front (convex side out), and a little distance behind is a very wide slot (as close as possible to that into which a Waterhouse diaphragm is inserted) in which is placed the posterior combination, four of which I already possess. This posterior combination consists of a double concave crown glass lens an inch and a-half in diameter, placed in contact with a meniscus flint of the same diameter, the convex surface of which goes to the outside, and when *in situ* is next the sensitive plate.

For a temporary purpose, on one occasion, I made use of a concave (short sight) spectacle glass as one of the elements in a new posterior I was constructing, and it has behaved in such an admirable manner that I have never desired to have it superseded in favour of any other. What is important to observe is that, the conditions being reversed from those existing in an ordinary achromatic lens, the concave lens must here be of crown glass and the meniscus of flint. Both of these are purchasable commodities, and hence experiments made in this direction need not entail a heavy expenditure to the amateur. The professional photographer ought to enlist the services of the skilled optician, provided he can find one who will go out of the beaten and pleasant path of regular lens manufacturing, which I have found few quite willing to do.

PHOTOMICROGRAPHY WITH HIGH POWERS AND ARTIFICIAL LIGHT.

By R. L. Maddox, M.D.

Rather more than ten years ago I made a few photomicrographs of some gatherings of atmospheric dust, collected by my "aëroconiscope," described and figured in the *Monthly Microscopical Journal*, June, 1870. At that period there seemed little chance that photomicrography would

be utilised in this country for the correct registration of such minute objects as might be found floating in the atmosphere. Since that time a vast impetus has been given on the continent, in America, and in this country to the study of some of the minutest living bodies as bearing on the issues of the germ theory of disease; and their registration by photomicrography has been of late accomplished in a most perfect manner in Berlin, by Dr. Koch and his two assistants, far surpassing anything we have seen done in this direction in this country or elsewhere.

So minute and almost invisible are some of the *Schizomycetæ*, under which are grouped the *Bacilli*, *Bacteria*, and *Micrococci*—minute bodies found in water, in vegetable infusions, in decaying substances, and in certain diseased states of living organisms of a higher grade, as well as after their death; some represented by tiny rods and filaments, others double rods, and minute spherical bodies, single, in pairs or chains—that to photograph them successfully it has generally been deemed necessary to stain them with one of the aniline dyes. They have a very great affinity for the methyl-violet blue, and this is used, especially in the examination of the blood and sections of the tissues, for differentiating these minute objects from various molecules and minute structures belonging to the tissues themselves. Unfortunately this colour is one wholly unsuited for photography. In its place Dr. Koch has successfully substituted the use of Bismarck brown.* So important has it been reckoned on the continent to be able to correctly register the occurrence and exact position of these very small organisms that, rather than trust to the artist's eye and hand, photography is employed, and a photographic laboratory is generally attached to the pathological laboratory. In this country one regrets to find this necessary adjunct wanting, and the chance of getting such specimens photographed is left to the individual or the amateur who may find time, and has the patience, to attempt the difficulties. This is far more than with ordinary photography. Dr. Koch found that he had to put aside the dry gelatino-bromide plates and employ collodion and the nitrate bath, using sunlight from a heliostat and oil-immersion objectives to obtain the best effects, which were marvellously rendered. The negatives were made so as to be removed from the glass support, and hence reversible. The heliotype prints from them had a charming appearance and were beautifully executed. These, and also many specimens, were shown at the meeting of the International Medical Congress, lately held in London, and fully proved the value of calling in the aid of photomicrography for such purposes.

* I, like others, have found it difficult to effectually stain these minute bodies with the Bismarck brown, of which I learn there are several commercial varieties, and I may not have used the most suitable. M. Kaschka has suggested, after drying the *Bacteria* as usual on the slide, the employment of iodide of cadmium in solution. This is allowed to remain on the organisms for two or three minutes, then washed off very carefully with distilled water, followed by a solution of nitrate of silver from the bath; then giving a short exposure and developing with a dilute iron developer well acidified with acetic acid; again washing, drying, and mounting in balsam. I expect some of the soluble salts of silver would answer equally well, if not better, and less likely to give precipitates that might be mistaken for the minute germs. Dr. Sternberg used sulphuric acid; then washing and staining by solution of iodine in iodide of potassium, which gives them a brown or orange colour, but it is apt to change their contours, and hence not available for more than temporary purposes.

The inconstancy of sunlight in this country renders a similar arrangement somewhat troublesome. The few trials I have lately made with artificial light lead me to hope that eventually it may be used for this purpose with success, though hitherto the chief difficulty has been to obtain on the gelatino-bromide plate a sufficiently-perfect printing density. The plan employed was by using a thirty-candle single wick, crystal oil lamp, and a large hemispherical condenser, to collect the diverging rays, which were received upon a full-sized achromatised prism (Abraham's achromatic condenser), and thence projected on to the field lens of the sub-stage condenser; a diaphragm with a small central aperture being placed in the cap over the smallest or front lens, the sub-stage is racked so as to give a uniformly-bright light over the field upon the ground glass screen, at a distance varying from two to three or more feet from the stage.

It was generally found advantageous to place a diaphragm with a small aperture immediately beneath the microscope object slide, when not employing an immersion condenser and objective, to avoid as much as possible any disturbance of the image by reflected surface rays. The condenser mostly required to be slightly withdrawn after the brightest image had been obtained upon the screen, to avoid interference lines. Unfortunately this lessens the power of the illumination, already feeble. Exposures had often, for the coloured minute objects, to be extended to six minutes. Such lengthened exposures with high powers mostly gave, under very varied developments, the appearance in the negative of over-exposure or flatness; yet with less only the faintest image could be obtained. In sunlight, with half-a-second's exposure at three feet and beyond, this flatness is less, though still apparent; and there is considerable trouble in getting such a negative up to fair printing density by one operation, if at all. No doubt the electric or magnesium light would obviate largely these difficulties, but with them there is considerable trouble connected with the focussing on the screen; hence I have been desirous to find some other satisfactory artificial light which might be kept burning for the entire time found necessary. Crystal oil is certainly deficient in the chemical rays, and these, when filtered through a series of lenses, become much less intense. There have been at various times many suggestions for increasing the chemical power of an artificial flame; and if we set aside the electric and magnesium light, as well as the oxyhydrogen and oxycalcium—though the first will rather sooner than later find its place in the photographic studio—there is left a considerable field for experimenting. Unfortunately it demands more time than I can conveniently give to it; but the foregoing remarks may stimulate others to try their hands in a path where the inherent difficulties can only be vanquished by employing the best materials, the most perfect arrangement of the apparatus, and abundant patience. The triplex and duplex lamps were found less satisfactory than the single wick.

FERROUS-CITRO-OXALATE AS A GOOD STANDARD IRON DEVELOPER.

By Captain Abney, R.E., F.R.S.

In testing plates a great desideratum is a developer which shall require no retarder in order to keep them free from fog. Soluble bromide, for

instance, with alkaline development, will vary according to the kind of plate used, and when ferrous oxalate is employed with collodion emulsion it requires a large quantity of bromide to keep it from reducing the bromine, which is unaltered by light. Hydro-kinone answers the purpose of a standard developer; but, as it is difficult to obtain, an iron developer is somewhat better to employ generally.

Dr. Eder has, during the course of the year, shown us that ferrous citrate dissolved in ammonio-citrate is a developer, though a feeble one, for gelatino-chloride plates, and, on using it, it struck me that a better developer, perhaps, might be obtained by combining oxalate and citrate together. The outcome of my experiments was the developer made as follows :—

Citrate of potash	100	grains.
Ferrous oxalate	22	,,
Water	1	ounce.

The potash salt is dissolved in water and brought to nearly boiling point. The ferrous oxalate is then added dry to the solution, and well shaken up in a corked bottle. It will readily dissolve. There is, apparently, an interchange of acids, and we have ferrous citrate dissolved in a mixture of potassium oxalate and potassium citrate. This developer is a very beautiful one in its action. It will develope plates prepared with any haloid salt of silver, whether held in gelatine or collodion, *without the addition of a retarder.* It gives a dense image, and with gelatine seems to exercise a beneficial effect on the film. The greatest triumph for it is, however, the easy development of collodio-chloride. With this it gives a splendidly-black image, full of detail, and coming up gradually. Until Dr. Eder showed how gelatino-chloride could be developed with ferrous citrate held in solution by ammonium citrate, I was unaware that any *certain* "chemical" developer for the chloride was known. With the ferrous-citro-oxalate we have one which is not only certain but very manageable in its action. With silver bromide the colour given to this film is somewhat olive colour mixed with black.

This developer when made has a reddish-bistre tint, quite unlike ferrous oxalate. If oxidised it becomes a full olive, all trace of a ruddy tint disappearing. In this latter form it is a very feeble developer. If kept in corked bottles, however, it retains its original colour for a long time, and remains of its pristine activity. To increase its developing powers either with collodion or gelatine films a weak solution of hyposulphite of soda may be mixed with it—about ten drops of the following to each ounce of developer used :—

Hyposulphite of soda	5	grains.
Water	1	ounce.

Old developer becomes energetic when this is added to it. It may be remarked, by the way, that the addition of hyposulphite to a ferric salt reduces it entirely to the ferrous salt. It does not seem improbable that this action may be of use in making old ferrous oxalate sensitive.

NOTES ON PHOTO-ENGRAVING WITH BITUMEN.

By MAJOR WATERHOUSE, B.S.C.

IN turning over an old note-book I find some jottings on the above subject which may be worth recording.

A bitumen plate developes very much better after it has been kept a long time in darkness. I have almost always obtained firm, solid images on plates that had been kept some months. In developing newly-coated plates the image is very apt to break away.

The coating of bitumen should not be too thick. The exposure required with a thick coating is considerably longer, and while the finer parts are developing there is risk of the more open parts breaking away. It is better to over- than under-expose, because an over-exposed picture can always be developed by the use of stronger solvents.

The best solvent appears to be turpentine, or turpentine with olive oil. Benzole is too strong, but is sometimes used partially saturated with bitumen. Paraffine oil also answers, and has a peculiar softening and swelling effect on the bitumen in the parts unexposed to light.

In copying engravings by contact, if they are well wetted with a mixture of glycerine and water and then squeezed down on the bitumen surface, they will dry very flat and in more perfect contact than can be obtained in any other way. The glycerine does not seem to interfere at all with the action of light.

NOTES ON DEVELOPMENT.

By Colonel Stuart Wortley.

In answer to the Editor's request for an article I am afraid I must take gelatine as a topic, though, perhaps, the present issue may be even too full of the same subject.

I will, however, confine myself to development, in which I have often said I believe the real secret of good work to lie. It is no difficult matter to prepare a thoroughly good gelatine dry plate; but, given a good plate, it is certain that a careful and scientific worker will get a vastly better result therefrom than the "develope-all-plates-with-the-same-developer" man would do. The latter creed, I am glad to find, is generally scouted here, while our keen American cousins laugh at such an idea.

The application of ammonia *alone* to the plate in the first instance has been of great assistance to me this year. Not only does it much increase the sensitiveness of a plate, but it is the very best means of avoiding fog. The great sensitiveness imparted to the plate by the ammonia soaking enables us to use a maximum of bromide for restraining purposes afterwards, and a brilliant negative is thus obtained.

I am one of those who believe in the power of bromide, if used in excess, to *prevent* the detail in the deep shadows of a negative from coming out at all; but the ammonia applied to the film alone first seems to neutralise this power in the bromide, and thus plenty of the latter may be used to obtain cleanness and brilliancy. That this fact has been appreciated by many workers I find from their letters to me, and the few who think the ammonia applied first produces fog have omitted to note the great extra sensitiveness thereby produced, and the consequent desirability of a full proportion of bromide. A friend informs me that, among others, Mr. A. Cowan has, at the Photographic Club, mentioned some comparative experiments favourable to this method of work, and I am glad to have his opinion on the subject. To those who like trying things I recommend them to try *fuming* a plate first before development in a closed box with a few drops of

ammonia for five minutes, and then develope with the three solutions together. It greatly increases sensitiveness, and gives the negative a richness and good printing quality that is most desirable.

The following bit of experience may be of use:—A friend showed me a batch of his "Favourite" plates useless from persistent frilling, and brought me two unexposed plates the subjects on which he was most anxious to secure. I adopted the expedient of coating the edge all round thickly with ordinary lard, carrying it round the edge and on to the back, so as to render it impossible for water to attack the edges. This cured the frilling from the edges, but the plates still rose and blistered in the central portions. Lard is so certain to be in every household that it may be worth while calling attention to this cleanly way of making certain of your films not frilling, even at the edges.

THE ROMAN ANTIQUITIES IN THE SOUTH OF FRANCE.

By Captain George Verney.

Having spent last winter on the coast of the Riviera, I think it may interest some readers of the Almanac to learn something of the very beautiful and, in many cases, perfect remains of the conquest by the Romans of this part of the country, and which are often passed heedlessly by the ordinary tourist, and even by those in search of suitable subjects for the camera. Unfortunately, while those who remained at home suffered from the effects of one of the severest of English winters, we in the "sunny south" were no better off, and the elements proved most unpropitious to the outdoor efforts of the photographer. As far as my experience goes, the best season of the year for outdoor photography in the south of France is from the 1st September to the 30th of November. After this date the weather is cold, boisterous, and rainy. All through January, February, and March of this year (1881) we never had one really fine day, or one in which it was a pleasure to work; therefore, though I had plenty of opportunity of seeing these beautiful remains, I was unable to bring away as many photographic reproductions as I could have wished.

Commencing at Orange, some 450 miles south of Paris, we find that nearly every town, and even every village, bears some trace and has some permanent record of the conquest of the country by the Romans, and though it would be impossible in the space of a short article to do more than glance at the most noteworthy, still the photographer with plenty of leisure, a fair stock of patience. and of a somewhat inquisitive turn of mind will discover for himself, off the beaten track of the railway, many objects of Roman antiquities of great beauty and interest suitable for the camera, and the existence of which are entirely unrecorded in any guide-book, whether general or local. The whole of the district between Orange and Marseilles teems with monuments recording the greatness of the Roman empire; and the photographer possessing a fair knowledge of the French language should find no difficulty in discovering these treasures and bringing home permanent records of their beauties.

At Orange there is but one hotel, and that rather a poor one; but it is conveniently situated half-way between the two most important Roman ruins—the one a magnificent triumphal arch, and the other the remains of the largest theatre in the world. The triumphal arch lies about a

quartsr of a mile from the hotel, on the road to Lyons, and is a very fine specimen of Roman architecture, having three archways and twelve columns, and in form something of the shape of the Marble Arch in Hyde Park. It dates from about 200 A.D., and is covered with sculptured reliefs representing scenes of Roman triumph. Unfortunately the west side has been restored—possibly from a fear of its falling; but a very good photograph can be obtained of the arch from the south side, more particularly as it stands well out in an open green, from whence a good view is easily obtained, and which represents the arch just as it was left some 1,600 years ago by the Romans, with the exception of the wear and tear of ages. Returning now through the town, we come on the huge wall, 118 feet high, 338 feet long, and thirteen feet thick, which forms the back of the stage of the theatre, to which is attached some slight remains of a circus. Unfortunately the photographer has here difficulties almost insurmountable to contend with to obtain a satisfactory picture. This huge wall, full of curious doors, windows, and passages stands at the base of a very steep hill, on which the audience were seated in tiers one above the other to watch the actors on the stage. A very strong wind, even in the calmest weather, is always raging down this hill, and, striking against the wall at its foot, produces a sort of small hurricane, which, finding no immediate outlet, rushes back to the hill, and effectually prevents a camera being kept in a steady position for a second; while all the trees, ferns, and grasses which have grown over this beautiful ruin are always in perpetual motion. I could not help wondering how the Roman ladies were able to endure this small tornado during the theatrical performances, and what an intense relief a little of this natural ventilation would be in some of our London theatres. The enormous, long wall is also very much against the photographer being able to secure a photograph which would give a general idea of the whole place; and, though the whole theatre is full of interest, it is scarcely worth the photographer's while to devote much time to it. It is also inaccessible in many desirable points of view, and therefore disappointing to the artist.

Between Orange and Avignon, on the main line, it is well worth while to branch off to Carpentras, and take a photograph of the triumphal arch at that place. Taking, then, a carriage down to a station near Avignon, passing on the way more Roman ruins, including triumphal arches, granite columns, and a small palace *en route*, a curious town (now almost deserted) will be passed, which is literally cut out of the rock. It is about a mile off the road, but should on no account be passed without a visit.

On reaching Avignon the photographer will find a choice of good hotels, notably the Luxembourg. The object most worthy of his attention is the abrupt Rocher des Doms—a rock some 300 feet high—which commands the whole of the town. The view of this rock, surmounted by the cathedral, forms a striking picture either from the public gardens or from the bridge which crosses the river Rhone; and the view from the rock itself is very fine, though more suitable to the landscape painter than to the photographer. The latter should lose no time in crossing over the river and taking views of the town of Villeneuve, with its citadel and ancient towers; nor should he omit a view of the west front of the cathedral, though, except with a very wide-angle lens, he will scarcely get more on one plate than the beautiful

porch. The old palace of the Popes, though full of interest, does not make a good photograph, except when taken in a view of the whole of the town.

Leaving Avignon we arrive in half-an-hour at Tarascon, and here I should advise the photographer to wait long enough to take a view of the fine old castle, surmounted by the comparatively-modern Gothic church, with the river Rhone in the foreground, and taking in a part of the bridge over that river; nor should the old castle of Beaucaire be neglected, and the photographer will do well to expose a plate or two in favour of the old and picturesque town of that name which is close to Tarascon, and only divided from it by the river Rhone.

Leaving now the main line to Marseilles, in three-quarters of an hour we reach Nimes, and almost at once, after our departure from the station, we plunge into the midst of the Roman antiquities. The first prominent object is the vast Roman amphitheatre, consisting of two stories each pierced with sixty arcades, and together seventy-four feet in height. The exterior is in excellent preservation, and well cared for by the local authorities. Some idea of the vastness of this structure will occur to the reader when he understands that there are thirty-two tiers of stone seats rising one above the other from the large arena in the centre, and that accommodation is provided for 23,000 spectators, who are all equally well able to see the sport provided for their entertainment. Having secured one or two good views of the exterior it would be almost superfluous for the photographer to attempt more, as the views are identical all round this vast circular structure. The same remark applies, though rather in a less degree, to the interior, though I should recommend him to take at least one view from the highest point he can reach and one from the lowest. Proceeding down the main street of the town he will soon come to the "Maison Carée"—an almost perfect specimen of a Roman temple, with thirty Corinthian columes—ten detached and twenty immured in the walls of the building. There is a large open space to the west, which enables a good view to be easily found. Proceeding onwards the photographer will arrive at the public gardens, in which he will find the Roman baths in almost the same state as they were left by the Romans themselves. They consist principally of terraces supported on columns standing in the water, the reflections in which will commend themselves to the artist, and induce him to reproduce them by the means of his camera. At the summit of the public gardens is a very interesting old Roman tower, but impossible to reproduce by photography, as it stands at the summit of a high and steep hill and is scarcely seen until reached, being hidden by trees and shrubs. The view from its summit is very remarkable, extending over the whole of the district called Les Bouches du Rhone. Two eminent Roman gates to the town—the Porte Augusti and the Porte de France—are still preserved, and though worthy of a visit are not suitable for photography. The artist should not leave this neighbourhood without making the excursion to the Pont du Gard—a distance of some fifteen miles, through flat and uninteresting country. About half-way a pretty village is passed, with a bathing establishment and two very charming bridges over the river. Two or three pretty views may be obtained here. The Pont du Gard itself is a monster aqueduct crossing over the valley of the Gard, at the bottom of which runs the river of that name. The aqueduct is based on six large

arches, which are surmounted by eleven smaller ones, and which in their turn support thirty-five of a much smaller size. The effect of these three tiers of arches, rising as they do one above the other, have a most grand and imposing effect. On the top of the highest tier of arches still exists the aqueduct which conveyed water in the time of the Romans for the use of the inhabitants of Nimes. A carriage bridge has been added in modern times to the old Roman aqueduct—an excrescence which rather takes away from the beauty of the original structure. Here the photographer may well spend some considerable time, as on all sides his attention will be taken up by the striking effects of this stupendous piece of architecture and the adjoining scenery.

Leaving Nimes, and proceeding towards Marseilles, we arrive at Arles—another town celebrated for its Roman amphitheatre and theatre. The former is rather larger than the one at Nimes, but in nothing like such a good state of preservation, nor is it so accessible to the photographer. Perhaps the best view of it is from one of the towers which surround it; but this is rather too much of a bird's-eye view to be pleasing. The theatre at Arles is not nearly so large as the one at Orange, nor is it so complete.

The last of the Roman ruins which I visited in this neighbourhood for the purpose of photographing were those at Fréjus, between Toulon and Cannes. Unlike those at Nimes and Arles, which are mostly built of stone, the Fréjus ruins are, like those at Orange, built of brick, and consequently in a more dilapidated condition. They consist of an amphitheatre, a Roman archway (restored so as to be quite destroyed as a relic of the Romans), and several detached arches which formed part of the aqueduct. extending some twenty miles up into the mountains. The whole of the ground round Fréjus is honeycombed with ruins, some of which have been recently laid bare, showing distinctly the forms of the various houses and their apartments. Fréjus, before it was destroyed by the Turks, contained some 80,000 inhabitants; now it has barely 3,000, including amongst them a vast army of black-coated individuals, whe swarm over the roads in troops like black beetles, and are preparing themselves to undertake the duties of priests in the Roman Catholic church. Fréjus now stands on a slight eminence, at a distance of about a mile from the sea; but in the times of the Romans the sea washed the foot of this eminence, and the iron rings in the walls of the town are shown to which the Romans used to attach their boats, and the pier on which they landed.

For those who, like myself, may be banished by circumstances from England for a winter season, much of interest may be found for them, if of a photographic turn of mind, by visiting these almost unique monuments and bringing away negatives of their beauties.

HINTS FOR THE PRODUCTION OF UNIFORM, RELIABLE PLATES AND BRILLIANT NEGATIVES.

By Herbert B. Berkeley.

It has always seemed to the writer that it would be a very important gain to those who prepare small quantities of plates were it possible to

obtain sensitive silver bromide which could be added at any time to a solution of gelatine—not so much on account of a consequent saving of time and trouble as on account of certainty and uniformity of result; for amateurs seldom have inclination and opportunity for preparing large numbers of plates on a single occasion, though few would object to making in two or three operations sufficient emulsion for use during a whole season, provided it could be depended upon.

If two or more emulsions were mixed it is evident that all plates prepared with the mixture at various intervals of time would possess like properties, always supposing that the gelatine undergoes no change, and, perhaps, it may be added, the emulsion have an acid reaction and be kept several days for possible "ripening" before the first batch of plates is prepared.* The opinion which has been expressed that it is not advisable to mix bromide of silver in different states of sensitiveness, and then develope them together, seems quite untenable; for, if anyone will take the trouble to dilute an emulsion and then allow it to stand for a considerable time in the fluid state, he will find that various states of bromide are present—perhaps ranging from the fine powdery condition, transmitting ruby light, in the upper strata, to the crystalline modification midway and coarse deposit at the bottom.

Every emulsion contains, after digestion in the fluid state, various forms of bromide, and these, perforce, must be developed together. Upon the principle of averages it would seem, indeed, that it is actually advantageous to mix emulsions, for by so doing the good qualities of one emulsion tend to correct the bad qualities of another. Moreover, were a film to be composed of bromide of similar character, either it would give thin, coarse negatives or, on the other hand, a dense and fine deposit and but limited sensitiveness in the camera. It appears certain, then, that a mixture of different emulsions is more likely to result in gain than in loss of desirable qualities.

The methods, of which an outline will be given, do not, however, necessarily entail any such mixing of emulsions, since enough emulsion can be prepared in one batch to coat many dozens of plates on any subsequent occasion that may be convenient. These modes are not put forward as perfected, but merely as indications of a direction in which success may certainly be met, since, in the experience of the writer, failure has not yet occurred. Still, further experiments should be directed towards a method for storing pure, or nearly pure, silver bromide, the whole of the gelatine being added just before the plates are coated. Alcohol when present in quantity is a good preservative of gelatine, and the quantity of the latter present in the "stock emulsions," which will be described, is but small; for all this it might be safer to leave the gelatine out altogether, and to use the alcohol to keep the bromide sweet and form a convenient vehicle for transferring bromide from one bottle to another.

It may be stated at once (seeing that at present plates are valued in proportion to their sensitiveness) that great sensitiveness has not yet been attained, though it is only right to say that it has not been sought for. At present only "wet-plate" rapidity has been required.

* This "ripening," probably, does not take place when the emulsion has an acid reaction—at least at a low temperature.

Some extremely good landscape plates were made as follows (and certain details will be given, not with a view of their being followed, but in order to show what should perhaps, if possible, be avoided) :—At the end of last May, the temperature of the room being 70° Fahr., ten grains of Nelson's No. 1 gelatine and 5·2 grains of potassic iodide were dissolved by warming in half-an-ounce of water. In another vessel sixty-eight grains of ammonia bromide were dissolved in ten ounces of water, and in another vessel eighty-eight grains of silver nitrate in ten ounces of water. To the warm, iodised gelatine five drachms of the silver solution were added in driblets during three minutes. After agitation the bromide solution was poured in—a small quantity at first—a rotary motion being given to the flask, as before.

The remainder of the nitrate solution was then added by degrees during eighteen minutes. The flask was then placed over a spirit flame, aud twenty-five minutes elapsed before ebullition commenced. Boiling was continued for ten minutes. After the emulsion had partly cooled it was poured into a twenty-ounce bottle, and when it had further cooled one drachm of "medicinal" hydrobromic acid was added. The bottle was then put aside for the bromide to settle, which it did very slowly—at anyrate the liquid was very opaque after perfect rest during one month. At the end of that time the water containing some fine bromide was poured off, and the bottle was filled with water containing a few drops of carbolic acid. On July 9th this water was poured off, and to the bromide at the bottom of the bottle were added eight drachms of water, thirty grains of white French gelatine, and five drachms of alcohol (·805). This emulsion was put into a four-ounce bottle, and there remained (often in a liquid or semi-liquid state) during the extremely warm weather of that memorable July.

With some of this preparation, which was arranged for five ounces of emulsion, plates were coated on August 1st, each ounce of emulsion having twenty grains of Coignet's gelatine in addition to the gelatine already present in the stock emulsion; that is, twenty-six grains in all, and, of course, the requisite quantity of water was also added. On each half-plate two drachms were poured. The plates when dry were moderately opaque, and the surfaces of medium brilliancy.

It is not much to be wondered at that these plates were subject to frilling in prolonged development, seeing the liquid state in which the "stock" had been kept during the hot weather.* Moreover, it is possible that the frilling was caused by the drying at the extreme edges of the films before the gelatine had set. This, according to several authorities, is a fruitful source of frilling; and it mght be suggested that when the temperature is high and the air dry (when there are many degrees between the temperature of a wet- and dry-bulb thermometer) the air in the room should be damped in order to prevent drying taking place until the setting of the gelatine is completed; and that the temperature of the wet and dry bulbs may differ more in cold weather than during the warm season. Of course, after the plates are set, the drier the air the better its effect. The frilling of these plates was prevented by an edging of shellac in alcohol; and "Coignet's pits" were perhaps

* A harder gelatine than that used with the "stock" would have, in all probability, proved advantageous.

avoided by rubbing the flakes with cotton wool under the tap previous to solution—a plan recommended early in the year.

In order to avoid what appeared to be the neecssary* but tedious time of subsidence of the bromide—for this, though somewhat flaky at first, became more finely divided on boiling, or, at least, the flakes were broken up—in the next batch a different course was pursued, in which the washing took place before the boiling. But before going further let it be noted that the "cold emulsification" during a period of over one month, together with a previous boiling during ten minutes, failed to produce a highly-sensitive bromide. Looking to Mr. H. Y. E. Cotesworth's recent experience, one might expect this "cold emulsification" during one month to have had a great effect, but perhaps the hydrobromic acid (about three minims to the twenty ounces of water) either retarded or entirely prevented the modification taking place.† It is possible that hydrobromic acid may not only retard the formation of the sensitive modification but also convert it when formed into the more insensitive form again, causing the bromide to again assume the finely-divided state. Certainly the acid would preclude the presence of free ammonia.

Now to describe the second method. The same formula was used, but double the quantity of emulsion was made. A very fine iodide emulsion was made first, as before. The bromide solution was then added. As before, the only warmth was that retained by the ounce of iodised gelatine; the other solutions were at the normal temperature—60° Fahr. A large funnel was then placed in the neck of the eighty-ounce bottle containing the soluble bromide, &c., and in the neck of this funnel was inserted a plug of cotton wool, so that one very large drop passed every second. Into this funnel the silver nitrate was poured from time to time, and a whirling motion was given to the contents of the bottle. The operation was tedious, as it lasted fifty minutes; but in these trials everything was arranged with a view of obtaining a very fine precipitate, though in a flocculent state. No doubt some of the care bestowed was not necessary.

When the whole of the silver nitrate had been added the emulsion, on examining it through the outside of the bottle, did not appear to be of a flocculent character; but at the end of an hour a large portion of the bromide had settled at the bottom of the bottle. Still, the supernatant portion remained very opaque. Ten minims of carbolic acid were then added, and the bottle was filled up with distilled water. After forty-eight hours only quite the upper portion had become clear, thus showing the extremely-fine state of the bromide, the whole bulk of eighty ounces containing only twenty of gelatine. The greater part of the opaque water was then poured off, and the bromide was rinsed into a beaker with fifteen ounces of distilled water. After twenty-four hours the bromide had settled, and the water was poured off, leaving about two ounces of water and bromide. To this was added one

* It is an open question whether the quantity of gelatine, of soluble bromide, as well as of water, might not have been reduced with advantage in this respect.

† It may be observed that the emulsion prepared by the second method, and kept seventy-two hours before any addition of HBr., did not exhibit any ripening effect—at least, there is no reason for supposing so There was, however, carbolic acid present.

and a-half grain of autotype gelatine, and in fifteen minutes three minims of medicinal HBr. The beaker was then put into a saucepan of boiling water over a Bunsen gas burner. Every two minutes a small drop (about one-third of a minim) of HBr was added during sixteen minutes, and the emulsion was stirred frequently. The gas was then put out, and one drop of HBr added as before. The emulsion was then put into the dark, and in a-quarter of an hour tested and found decidedly acid. Forty grains of autotype gelatine were added, and in half-an-hour gently dissolved. The contents of the beaker (about twelve drachms) were then poured into a small bottle, and seven drachms of methylated spirit were added.

Now, it will be observed that in the case of the first emulsion the boiling took place in a *flask*. The *quantity of gelatinous water was large* and so was the *excess of soluble bromide* over the silver nitrate used, and the *boiling was effected before the washing* by decantation. The conditions may be said to favour the rapid attainment of sensitiveness. The boiling, however, was continued for ten minutes only; and the preparation was then, during over a month, kept in contact with water containing hydrobromic acid. In the case of the second emulsion the *soluble bromide was removed before boiling;* the boiling took place in an *open beaker but for sixteen minutes.* About *one-tenth only of the water* used with the first emulsion was present in the second, but about the same proportion of gelatine to water was preserved, namely, nearly half-a-grain to each ounce, and the HBr was added *during the boiling.*

Whatever the cause, plates prepared with the second emulsion were only about half as sensitive as those made with the other emulsion; and, as may, therefore, be inferred, the bromide in the latter was more opaque, while the slower plates were, when dry, only semi-opaque. In both cases the plates develope very cleanly indeed from every point of view—no grey fog, no "red and green fog," no "silvery fog" (an aggravated form of "red and green fog," by-the-bye), and no staining of the film; and, in the case of the second emulsion (after keeping for six weeks), no frilling.

The developer used was a modification of the writer's method of alkaline development with sodic sulphite; but to go into this matter at the present time would entail making this already too long article entirely unfit for the Almanac. Only let those who like shadows clear as glass not ignore the hint.

Finally, this is a suitable formula:—

Pyrogallol	10 parts.
"Neutral" sodic sulphite	40 ,,
Citric acid	*quant. suff.*
Water ... to make up	100 parts

Place the sulphite in a graduated measure and dissolve in warm water, then about neutralise the solution (the sulphite is alkaline) with citric acid. Add the dry pyrogallol and make up to 100 parts with water. It is best to fill up well-corked and rather small bottles with the solution when it is intended to be kept a very long time. Each ten minims contain one grain of pyro.; and the solution is used in the same manner as any other "pyro. solution," but with very different results.

ON THE DRYING OF GELATINE PLATES.

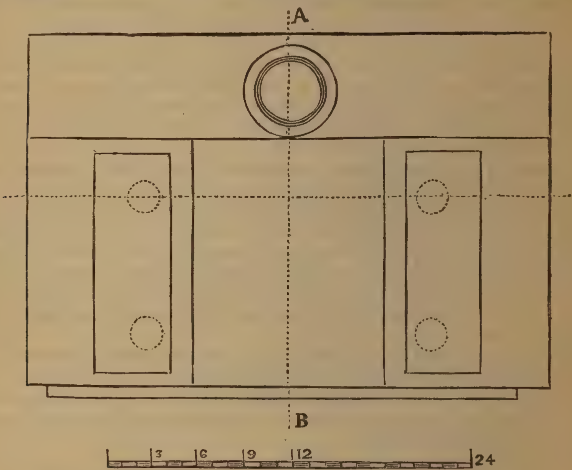
By W. K. Burton.

I have heard it said that it is easier to make a gelatine *emulsion* than one of collodio-bromide, but that it is far more difficult to make a gelatine *plate* than a collodio-bromide one.

I believe this to be true, and I also believe that the reason is to be found in the difficulty which attends the coating and drying of the gelatine plate.

In the collodio-bromide plate the film is far thinner and more porous than in the gelatine plate. In the latter the drying must be performed at a very moderate temperature, or frilling will ensue; and there must be no check in the process, or marks showing the outline of the part which was still wet when the check occurred will make their appearance. It is, therefore, almost an absolute necessity that there should be some special room or box for drying plates in—the former, where operations on a large scale are performed; and the latter for operations on a small scale.

Plan.



Scale of Inches.

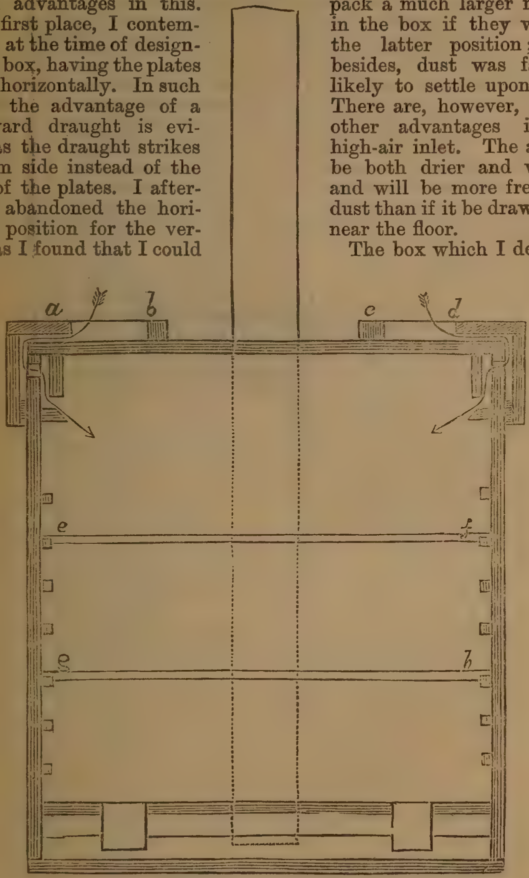
Taking the case where a drying-box is to be used, the great desideratum seems to be a very ample current of dry air at a moderate temperature. Many of the boxes at present in use have an air-passage so contracted that the current of air is necessarily sluggish and unevenly distributed after it has got into the box. Although the necessity for a rapid current may not make itself felt when only a few plates are to be dried, it certainly will when it is necessary to dry a number, as in the latter case the air will be loaded with moisture long before it reaches the plates nearest to the outlet.

In designing a drying-box I set the following conditions before me to be fulfilled :—First, the air-passages must be of ample area, and there

must be an arrangement for securing a thorough and continuous draught of air through them. Second, the air currents must be thoroughly distributed, so that all plates will dry at about the same speed.

I also thought that it would be an advantage to have the air current downwards instead of upwards. It seemed to me that there were several advantages in this. In the first place, I contemplated, at the time of designing my box, having the plates placed horizontally. In such a case the advantage of a downward draught is evident, as the draught strikes the film side instead of the backs of the plates. I afterwards abandoned the horizontal position for the vertical, as I found that I could pack a much larger number in the box if they were in the latter position; and, besides, dust was far less likely to settle upon them. There are, however, several other advantages in the high-air inlet. The air will be both drier and warmer and will be more free from dust than if it be drawn from near the floor.

The box which I designed

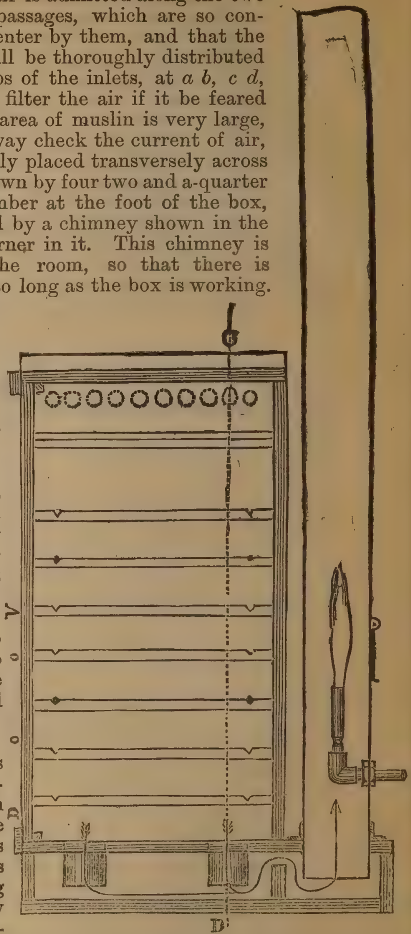


Section on Line C D.

to fulfil the above conditions, and had made for me by Messrs. David Laing and Son, of No. 2, Duke-street, Strand, has so well pleased me

that I think it may be useful to others wishing an efficient and, at the same time, cheap drying-box. Accordingly I give sketches of it here.

It will be seen that the air is admitted along the two top edges of the box by passages, which are so constructed that no light can enter by them, and that the air on entering the box will be thoroughly distributed through it. Across the tops of the inlets, at *a b*, *c d*, can be stretched muslin to filter the air if it be feared that dust may enter. The area of muslin is very large, so that it will not in any way check the current of air, as it would if it were simply placed transversely across the air inlet. The air is drawn by four two and a-quarter inch tubes into an air-chamber at the foot of the box, from whence it is extracted by a chimney shown in the section, with a Bunsen burner in it. This chimney is continued right outside the room, so that there is thorough ventilation in it so long as the box is working. I may mention that, were I fitting up another box, I should have an ordinary fishtail burner in place of the Bunsen. The latter is liable to "strike back" in case of an attempt to lower it, and the loss of heat in the case of the ordinary burner is very small. By a slight modification in the box it would be very easy to have the incoming air drawn over shallow troughs filled with chloride of calcium, and thus dried.



SECTION ON LINE A B.

It may be interesting to some of your readers to know that a crude chloride of calcium can be purchased for a few shillings per cwt. It is sold in barrels, and, although not by any means dry, has a considerable dehydrating effect, even when used as it comes from the barrel. It may be made as efficient for drying purposes as the purer article, costing over a shilling a pound, by the simple expedient of drying it on a shovel over the fire. It will be seen that the air-passage is nowhere contracted to a less area than fifteen square inches.

In the box of which I give the design the plates are placed vertically upon racks, the design for which I got from Mr. G. F. Williams, and

which are both cheap and efficient. They hold two dozen plates, two being placed back to back in each groove. The racks are then placed upon the stout iron rods, *e*, *f*, *g*, *h*, which can be raised or lowered into any of the notches shown, according to the size of plates to be dried.

With a temperature of about 65° Fahr., and with plates coated very thickly, the drying will be complete in about twelve hours if there be only a few plates in the box—say five or six square feet of glass. If the greatest amount that the box will hold—that is to say, thirty or forty square feet—be in, it will take twenty-four hours.

I have not been able to see that there is any tendency to local drying. Of course, as the current is downwards, the plates which are nearest the top dry a little before those at the bottom, but it is very little. The whole of the air in the box is changed several times every minute.

In my own case I have my box placed in a small room which I can heat up to any desired temperature with a gas stove; but if I wished to apply heat to the box itself I should have a second air-chamber on the top for the air to be drawn from, and this air-chamber should be supplied with air through a tube a foot or two long, forming a jacket round the iron chimney in which the Bunsen is burning.

ON CHLOROLEO-BROMIDE COLLODION EMULSION AND THE DEVELOPMENT OF DRY PLATES PREPARED THEREWITH.

By Captain J. B. C. Fox.

After many trials of gelatine, collodion emulsion, collodio-albumen, and other varieties of dry plates, I find that the precipitated chloroleo-bromide emulsion described by me in The British Journal Photographic Almanac for 1880 gives me the best general results. The development may be, as I have there stated, with ferrous oxalate solution, afterwards intensified, after well washing, with pyrogallic acid, citric acid, and nitrate of silver solutions; but I find that my best negatives were developed by the alkaline pyrogallic development described by me in The British Journal Photographic Almanac for 1879, pp. 49 and 50.

The general result of negatives made on plates so prepared and developed excel for printing purposes any negatives I have taken, either for landscape or portrait work. They are certainly not so rapid as the extra-rapid gelatine plates of the present day; but I would not, for easy working and developing, adopt any known method of preparing and developing dry plates in preference to my own formulæ, given by me as above stated.

IODIDE IN GELATINE EMULSION.

By Alexander Henderson (Montreal).

I see some discussion has been going on as to the advantage of silver iodide in gelatine emulsions. I have used it in various proportions for some two years, having first tried it from my liking for Mr. M. Carey Lea's old chlor-iodo-bromide collodion emulsion. I at first used it with the precipitation plan, but now always use Captain Abney's for-

mula from his book, and boil. Since its publication, however, I have been trying Mr. H. Y. E. Cotesworth's plan and find it admirable ; besides, I can preserve the precipitate in strong alcohol, so that it is ready by merely adding the gelatine. His formula has rather too much water, I think. Altogether, my experience is in favour of iodide.

The plates are brighter, I fancy, than with the plain bromide, and then there is the unspeakable advantage of being able to *see what you are doing* in a comfortably-lighted developing room.

As to their keeping qualities: I see no difference between them and the bromide plates. In April, 1880, I made a supply of gelatine emulsion plates by the following formula :—

Bromide of ammonium	180 grains.
Iodide of potash	20 ,,
Silver nitrate	326 ,,

They were made by the precipitation plan with a small quantity of gelatine to the ounce of water, using forty ounces of water in precipitation (twenty to the bromide and iodide and twenty to the silver), and washing in five waters. When the precipitate became *so fine* I had difficulty in getting it to subside. To the drained precipitate I added 400 grains of Nelson's No. 1 gelatine, shaking *very well* in a *large bottle*, and digesting twenty-four hours at 95°. The plates were very fine, with an exposure three times faster than average wet collodion. Now, these plates were supplied to one of the gentlemen of the Government Geological Survey of Canada, who began to expose them on the shores of Hudson's Bay early in May, used them through the summer, took them by Hudson's Straits, in a sailing ship, a six weeks' voyage to London, whence they went to Liverpool and Scotland and back to me here in February, 1881 (this year), so that, by my note-book, the first exposed plates were not developed till "*eight and a-half months after exposure, and came up as if exposed the day before*," not a plate failing. I do not see what more I can say in favour of a mixture of bromide and iodide of silver.

I fancy that there is a double salt formed ; for, otherwise, how is it, if a negative be very fully developed, that the sky, for instance, becomes apparently quite reduced when looked at from the back ? The colour of the silver salt in the emulsion seems to me much more orange in colour than simple iodide of silver, and we know that silver bromide is nearly white. I do not speak of transmitted light, but the colour of the precipitate in Captain Abney's plan and of the dried emulsion when in the form of pellicle. The plates seem also to take longer to fix than either of the two salts would do separately. However, I may be wrong in this.

INTENSIFICATION OF GELATINE NEGATIVES.

By W. Wainwright, Jun.

It is not with an idea of writing much that is novel that I offer the few following practical details on a subject which is of some importance to gelatine workers, though, for my own part, I rarely think a negative worth troubling much about that requires intensification ; but it does sometimes happen that a negative just requires a little strengthening, which would make it print with more brilliancy.

In order to decide which was the best among the many methods advocated from time to time I instituted a regular course of experiments, which has resulted in my strongly recommending the following as giving by far the best results :—

Protosulphate of iron	120 grains.
Water	8 ounces.

Then mix together—

Gelatine	15 grains,
Acetic acid (glacial)	3 drachms.
Water	5 ,,

Add this to the iron solution.

The above mixture should be made a fortnight or more before being required for use, as the older it is the cleaner and better it works. It should be clear and of a golden colour. Next, make a solution of—

Nitrate of silver.............................	10 grains,
Acetic acid (glacial)	10 drops,
Water	1 ounce,

and then a stock solution of iodine and iodide of potassium :—

Iodine	½ grain.
Iodide of potassium	1 ,,
Water	1 ounce.

Flood the plate to be intensified with water, and then in a weak solution of iodine and iodide for a minute—about the colour of pale sherry. Two drops of the strong solution to each ounce of water will give the desired colour. Rinse it off and apply the iron solution, and, after pouring over the plate in the dish (a porcelain one is the best for use) pour back into a glass measure, and add a drachm of silver solution, which keep moving about to avoid air-bubbles until sufficient density is obtained.

ON DRYING GELATINE PLATES IN DAMP WEATHER.

By E. Howard Farmer.

At the present time of year, when the weather is cold and the atmosphere charged with moisture and in our towns with soot or other suspended matter, one of the chief difficulties which amateurs have is that of drying their plates in a reasonable duration, and, at the same time, preventing particles of dirt from settling on the films. To those who are constantly preparing experimental batches of plates this having to wait—perhaps a day—for each batch to dry becomes a perfect nuisance. Having experienced these difficulties to a large extent, and tried nearly every method which has been suggested for overcoming them, I propose, for the benefit of others, to describe briefly my experience of these suggestions, and also the method which, as it were, by a process of natural selection I have found the best and simplest for the purpose.

Probably ninety per cent. of the drying-boxes in use are made after the pattern of that described by Dr. van Monckhoven in The British Journal of Photography for October 17, 1879, which consists of a box with shelves so arranged that the air drawn through is compelled to pass horizontally over each, one after the other, the draught being usually obtained by means of a pipe, in which is fixed a gas burner

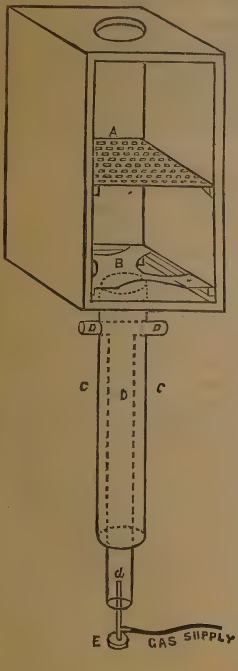
connected with the top of the box and passing up the chimney. I was the unhappy possessor of a box of this description for some time, and found, as no doubt many others have also, that it has in practice many serious defects. Foremost among these is that, owing to the circuitous course which the air has to make, it requires a very large flame (and therefore a large consumption of gas) in the pipe in order to get a decent draught; and, even when that draught is obtained, in wet weather it will sometimes take twenty-four hours to dry the plates, which means that, besides the delay, the cost of drying alone will perhaps be as much as the plates are worth.

Again: Owing to the manner in which the shelves are necessarily arranged, the air impinges against their under surfaces and is reflected down on to the films, in the same way as the flame is compelled to impinge on the ore in a reverberatory furnace; so that, in such places as London, where the atmosphere is more or less charged with suspended matter, the said matter finds a resting-place on the films and gives rise to spots; while, if it be attempted to filter the air before its entrance into the box by means of muslin or otherwise, it is found that the draught is also stopped or retarded most effectually likewise. Another objection to this box is that it is difficult to prevent the air from creeping up the sides of the shelves instead of passing over them, and, as a consequence, some plates become dry long before others.

In The British Journal of Photography for November 28th, 1879, there appeared an article recommending the use of sulphuric acid to assist the drying in damp weather, which was immediately tried by placing a shallow glass dish half full of the acid on the bottom shelf. It certainly did assist the action, saving, perhaps, twenty per cent. of the time; notwithstanding this, however, it was soon given up as causing more trouble than it was worth. A decidedly better plan (also recommended in the Journal) was the use of asbestos which had been soaked in a saturated solution of calcium chloride, dried in a ladle over the fire, and placed in a large iron tube fixed so as to be removable on the bottom aperture of the box. This arrangement shortened the time of drying to less than half and was used all one winter, it being only necessary to place the tube in the oven for an hour previous to drying. When not in use the ends were stopped with bungs saturated with paraffine.

A vast improvement on either of these methods is that described by Mr. William England in the Journal for April 23rd, 1880, in which wires are substituted for the shelves recommended by Dr. Monckhoven, and the air warmed as it passed over the plates, and wherein he says that the process of drying the plates is more dependent on a thorough circulation of the air than on the passage of the air over every plate. Experience has shown that this statement defines the perfection of correct drying, and for those who use only large plates it is difficult to imagine anything better than Mr. England's box. Where, however, small or several-sized plates are used the arrangement of placing the wires across is an objection, as, unless one be careful, the plates may come to grief at the bottom of the box; also in boxes of moderate dimensions, the tube running through its centre, is better dispensed with. I will now describe a modification of this box, which has been in use for some time and found to be as efficient, while it is free from these minor defects.

A light-tight box is constructed with apertures in the top and bottom, and ridges fixed round the interior for the shelves as usual; but instead of glass shelves others of perforated sheet zinc are used. In the bottom aperture is fixed a length of stove pipe, and in the centre of that, by means of a ⊤-piece at the top, a much smaller pipe, in which at the bottom is placed a small gas burner. The gas burner when lighted warms the inner pipe, and this again by radiation the outer one. Being thus heated they raise the temperature of the air in the annular space between them, which, thereby rising, circulates amongst the plates in the box and passes out at the top, to be followed by more air similarly heated. Thus there passes through the box not a furious draught but a gentle stream of slightly-warmed air, which can just be felt on placing the hand over the top aperture, but which, slow as it is, in the dampest weather, rapidly and uniformly dries the plates, and that, too, without depositing any particles of dirt on the films. The products of combustion from the gas burner pass up the inner tube and out from the ⊤-piece at the top. The accompanying sketch will show pretty clearly the arrangement.



A represents one of the perforated zinc shelves, about seventy-five per cent. of the zinc being cut out, the perforations being half-an-inch diameter. The zinc can either be sufficiently thick to support itself, or, what is better and more economical, thin and fixed on light wooden frames. The top and bottom shelves are of blackened wood, and cut away as shown in the diagram at B. C is the outer tube, which is four inches diameter and two feet long. A short piece of the same, with a cone over it, is also fixed on the top of the box. D represents the ⊤-piece and inner tube, which is one and a-half inch in diameter and two feet long. E shows a very small Bunsen gas burner. If gas be not available a benzoline lamp of moderate size burning paraffine oil can be advantageously substituted, as it will burn a long time without attention.

The interior of the box is two feet high by one foot wide by one foot deep, and the shelves are one inch and a-quarter apart; but, of course, it can be made of any size deemed suitable. It stands on a firm three-legged stool; the door can be either hinged or (as I prefer it) in grooves, and balanced with two weights by means of cords passing over rollers, so that it can be readily slid up and down, and, at the same time, being quite light-tight; an iron button at the top keeps it down when closed. The zinc used was obtained from Messrs. Braby and Co., Euston-road, where it can be had of any thickness and size of perforations.

There has been one objection made to this box, which, perhaps, ought to be mentioned. It is that drying with warm air causes the plates to frill. Now this objection, if true, would be a very grave one; but a few words will show that it is unfounded. The time that warm air is required is during the cold winter months, but the temperature which is needed even then is not more than the ordinary temperature of the air in summer; hence, according to this idea, plates ought always to frill in the summer, but we know that they do not. Perhaps, however, when I state that during the twelve months this box has been in use not a single plate of my own preparation has frilled, together with the fact that all commercial plates are, I believe, dried with warm air, it will go more to carry conviction than any argument. I conclude by hoping that those who have any difficulty in drying their plates will give this system a trial.

ON THE ACTION OF BROMIDE OF AMMONIA AS A RESTRAINER TO THE ALKALINE PYROGALLIC DEVELOPER.

By Lyddell Sawyer.

It is doubtful whether or not the active presence of ammonium bromide in the recognised pyrogallol developer is in every case fully appreciated by photographers. The following experiments were made to test the influence of variable quantities of this salt in the developing solution:—Four quarter-plate negatives were taken, exposure, pyrogallic acid and ammonia being equal, the bromide only being altered as follows:—

No. 1.

Ammonia	6 minims.
Bromide	6 grains.

No. 2.

Ammonia	6 minims.
Bromide	3 grains.

No. 3.

Ammonia	6 minims.
Bromide	1½ grain.

No. 4.

Ammonia	6 minims.
Bromide	None.

No. 1. The image appeared in eighty seconds, and the developing action ceased after about four minutes' contact. The resulting negative was apparently much under-exposed.

No. 2. The image appeared in forty seconds, the developing action ceased in about three minutes, and the negative showed excellent fineness of detail, but apparently somewhat short of exposure.

No. 3. The image appeared in twenty seconds, and the development was completed after about two minutes. The negative appeared well exposed, with a small tendency to fog. Fuller details but more flatness in quality than No. 2.

No. 4. The image appeared within ten seconds of first contact, and the legitimate developing seemed to cease in about forty seconds, but there was difficulty in determining, owing to the rapid accumulation of fog.

I next gave a plate double the normal exposure, and treated it with No. 2 developer. The action was similar to No. 3 as regards fulness of exposure and rapidity of development, but the resulting negative was much purer and deeper in the shadows, with an increase of roundness and gradation of detail.

Although these enumerated times of development appeared to complete the deoxydising action, yet by prolonging the presence of the solution a reactionary oxide deposit manifests itself, producing a quality of intensity which is decidedly to be avoided, in my opinion.

I repeated the foregoing experiments, using plates coated with a different emulsion, and again secured the same results. From the effects of these tests I am of opinion that many failures of gelatine plate-developing manipulations are due to the too great and, indeed, generally-unnecessary exaction of rapidity from the process, this severe tension being the progenitor to a number of evils, of which not the least is the loss of "bloom" and gradation in the negative.

A mere hint will suffice to render it apparent how great is the amount of control which may be obtained by the varied applications of bromide of ammonia.

I would suggest that two stock solutions of ammonia and bromide be kept at hand—the first containing one part of ammonia to *two-thirds* of bromide; the second to contain one part of the alkali and *one-third* of the restrainer. Expose, and work generally to use the first solution, and keep the second solution only for particularly dull weather, refractory children, and modifying miscalculations of exposure.

REMOVING VARNISH, &c., FROM GELATINE NEGATIVES.

By William Brooks.

Being able to remove the varnish, collodion, &c., from a gelatine film is a great desideratum and is very valuable, and I think my method will be worth recording in the Almanac.

There are various reasons which raise the necessity for removing the varnish from the film. The negative may have become stained from printing; is, perhaps, a little too dense to give the best possible result, or, perhaps, a little too thin. The last-named defects need never occur if a proof has been printed before the negative has been collodionised or varnished. I myself generally carefully make a print and then alter the negative as required, by reducing certain parts or strengthening others; and after that is done, and not until then, do I attempt to varnish.

To make a negative what I call perfectly safe for good work, where a lot of prints are required, I always collodionise first with a *rather thick* collodion, and then varnish with a good, strong lac varnish. This I use somewhat thinner than I do for ordinary wet-plate negatives, but just thick enough to dry with a bright surface. But with negatives from which only a few prints are required (as I have said before in former articles in The British Journal of Photography) I content myself with a simple coat of collodion.

Now, after a time, should the negative become stained, I can very easily remove this collodion film. I generally keep a few of the moulded glass dishes. I select one as near the size of the negative as possible,

place in it the negative to be operated upon with face uppermost, and pour over it equal parts of methylated ether (·720°) and methylated spirit. It is best to have enough to cover it to the depth of about a-quarter of an inch. I then place a plate of glass over the dish to prevent evaporation, and rock the dish for about two minutes. I must not omit to mention that I generally do this in the open air. I then remove the glass plate, and brush the surface of the film with an artist's wash brush about the size of one's finger. These can be bought at any artists' colourman's for about sixpence or eightpence. There is no need to be afraid of damaging the film, for it is perfectly insoluble, and the ether and alcohol will dissolve the collodion film.

I now drain well and give the film another dose of fresh solvents; this will entirely remove all traces of the collodion. I well soak in running water for about ten minutes, and the stain can then be removed with alum and citric acid, or the negative can either be reduced or intensified at pleasure, after which it can be collodionised and re-varnished.

Sometimes, if staining be the defect, it may be only the collodion film that is stained; if so, after the film has been removed it can be re-coated, and there is an end of it.

Should the negative to be treated have been merely varnished, methylated spirit only will be required to dissolve off the varnish. It is best to finish as before with clean spirit at the last; but, should the negative have been collodionised and also varnished, it is best to remove the varnish first with the spirit alone, and then the collodion after with the ether and spirit combined as before. The solvents can be used over and over again, and that which has been used only for removing varnish can be used for thinning varnish, so that nothing need be wasted.

I think this system of being able to remove the protective agents very valuable, and I find it more so with gelatine films than with collodion, as the latter are far more liable to stain than the former, and there is less fear of damaging a gelatine film than one of collodion.

Another method I have occasionally adopted—instead of either varnishing or collodionising—is to rub pure white wax dissolved in ether over the surface of the negative, and it is wonderful the power it has of resisting damp. I apply it with a piece of soft rag, and then polish off with another one, dry and warm. Of course I do not mean to say this will do for general wear where a batch of prints are required, but should think the wax might be used instead of collodion before varnishing. The latter is only a suggestion, and, I have no donbt, would be effective.

THE RIGHT PLATE IN THE RIGHT PLACE—ART *v.* INSTANTER NOVELTIES.

By H. A. H. Daniel.

The Editor of this Almanac having asked me to write an article for it this year, I thought that, perhaps, a few stray notes of my experience with gelatine plates during the past two seasons, if brought together, might be interesting or, possibly, a little helpful to some.

The Class of Plate Should be Suitable to the Subject.—By this I mean that a plate suitable to one class of subject would, in my opinion, be wholly unsuitable to others; and this, I fear, is greatly lost sight of by a large number of photographers. How often we find a man working in a picturesque district where broad and powerful subjects are met with, and on inquiry we find he is using—for ordinary subjects, mind you—plates "ten times as rapid as wet!" What a fallacy this seems to me to be!

No one would for a moment have thought of using for general work collodion specially prepared for instantaneous work, it being well known to be unsuitable. Much more, then, is it undesirable to do so in the case of gelatine, and for the following reasons:—

Firstly. I feel confident in stating that a rapid gelatine plate does *not* possess in itself the adaptability requisite for successfully and truly rendering broad and powerful contrasts, and the beauty of *progressiveness* in various planes of *distance*. Thus, I can safely say I have *never* seen a powerful and rich foreground, a less-intense but beautifully-composed middle distance, and a mountainous or hilly foliage-clad distance with fine atmospheric effect truly and poetically rendered in a rapid gelatine plate. Either there is crudeness or harshness in the foreground, want of delicacy in the middle distance, or (most often) the distance weak and unatmospheric or invisible, having disappeared and merged itself in the sky. I feel perfectly convinced that a rapid plate will *not* adapt itself to the various grades of actinism comprised in any subject possessing breadth; and without breadth a picture, to my mind, lacks one of the first requirements of an artistic production. I would, therefore, strongly urge the use of *slow* plates—certainly not more than twice as rapid as a wet plate—for ordinary woodland, mountain, and river subjects.

Of course, in seascapes a rapid plate is at *all* times a *sine quâ non*, and there is not one case in twenty where such plates are inadmissible, as in subjects of this kind there is, as a rule, far less contrast, everything being more evenly lighted, and the capabilities of the plate being, as a consequence, far less strained. That this is so is very fortunate; for in yacht races, fishing scenes, &c., a slow plate would, of course, be quite useless. I can strongly recommend a slow gelatine plate made by digestion and not boiling, and containing iodide, as giving the most delicate, harmonious, and plucky image, with plenty of "sparkle." I am more positive on this point, perhaps, than I should otherwise be, as I have experimented somewhat considerably with the best-known rapid plates, the slow plates I always use being of my own preparation.

Secondly. In photographing a broad style of subject with a slow plate one has considerable power in giving more than one exposure, if necessary, choosing the best time for one portion of the landscape, thus getting the best effect on that part, and then giving a further exposure on, perhaps, a dark foreground only, or some other portion; but with a rapid plate it is wellnigh impossible to do so with any safety, as the result would most probably be over-exposure somewhere. A full exposure and weak developer always used to be much recommended, and I believe in it now greatly. But my experience with rapid plates is that they will *not* stand it; so that what should give a beauti-

ful harmony in the case of a slow plate weakens, flattens, and perfectly ruins a rapid one.

As to development: So much has already been written that I will only say—*Do not develope away from home.* There is nothing like developing always under *similar circumstances*, and I believe more negatives are spoilt by inconveniences and imperfect washing away from home than by errors in exposure. Of course, I advise this to those generally pretty correct in their exposures.

Is Instantaneity Art? This question is suggested to me by the most remarkable tendency there seems to have been of late in juries to get marvellously enthusiastic over instantaneous work. "Is instantaneity art?" *Per se*, undoubtedly, no, but, in combination with artistic conception and composition we are indebted to it for some of the most charming productions of modern photography; but, mark you, *only a few!* The great majority of good instantaneous pictures are as such very interesting, and, comparing them with the attempts of only a *few* years since, really wonderful. But let us examine the large number exhibited of late at various exhibitions, and how many of them can claim the least pretence to being artistic pictures? or how many of them are worthy the name of compositions? Not one in ten; and in this I am sure those who have carefully examined such pictures will bear me out. It seems to me that, no sooner is it found possible to bring extra-rapid plates to bear upon rapidly-moving objects with success, than we get hosts of such productions at exhibitions, including those of almost every class conceivable—nearly all of them utterly devoid of poetry of motion, the subjects uot worth looking at, without the slightest attempt at composition, and as unattractive as they can possibly be.

Now, unless there be a special award for instantaneous subjects, it seems to me that all but really those with some pretence to artistic excellence should be excluded from exhibitions, as they are at best but passable examples of technical excellence, which, as a matter of fact, is now within the reach of all. And I do assert that the tendency to drift towards absurd admiration of such productions, simply because they are "taken in the one-hundredth part of a second," at the expense of the older-fashioned but *true* and *better-wearing* style of art, namely, legitimate high-class compositions of nice feeling, is a complete prostitution of the art.

In common with, I doubt not, thousands of others I have amongst others some negatives of technical excellence and wonderfully-rapid exposure very *interesting to me*, but certainly not possessing one iota of artistic merit, and wholly unfit for exhibition. That rapidly-exposed pictures *can* be artistic, Mr. Abel Lewis's, Mr. Gale's, and Mr. Whiting's lovely little marine pieces undoubtedly prove; but at recent exhibitions there has been far too much *furore* over "meteor-catching;" and I do most sincerely hope that juries will check such absurd nonsense.

LIGHT IN THE DARK ROOM.

By George Smith (London).

Great diversity of opinion exists as to the best medium through which the light required for working the highly-sensitive gelatine dry plates

should be filtered, so as to afford adequate protection from the actinic rays. Many manufacturers insist on two thicknesses of the deepest ruby glass, while most operators find a light "canary" sufficient for their purpose.

Both are probably right to some extent; but, as the main object to be attained is that of sufficient light for comfort in working consistently with safety, the desired end will probably be better attained somewhere between these two extremes.

If a sensitive plate be exposed direct to the rays of the solar spectrum, it will be found that the most actively-energetic actinic rays are at the blue end, where they extend far beyond the visible rays; whereas, at the red end, not only are they non-actinic but actually negative, or reversing—that is, if the plate have already received a preliminary exposure to light, the red rays will undo the work.

Here, then, would appear to be the grand desideratum—a pure red light, which not only would have no injurious effect upon the plate, but would restore those which had been accidentally exposed to light to their original sensibility—a pure red light and plenty of it.

Theoretically, a red glass cuts off all other rays except the red, but in practice it is found quite impossible to procure any colour spectroscopically pure; and, therefore, even the deepest ruby glass allows some actinic rays to pass, all rays except the red being more or less actinic. On the other hand, the *deepest* ruby glass shuts off a great part of the red rays, and only become comparatively safe by the opacity of the colouring matter cutting off, at the same time, both the innocuous red and the hurtful actinic rays in the same proportion, until at last comparative safety becomes comparative darkness.

It being impossible to procure a pure red, the next step is to see in what the impurity consists. There are many shades—from scarlet (which is a mixture of red and yellow) to crimson (which is a mixture of red and blue); that is, a scarlet glass allows both red and yellow rays to pass, while a crimson allows red and blue rays to pass.

A further examination of the actinic effect of the spectrum on a bromide plate shows that, while the yellow rays are exciting, the blue rays are the most actively energetic. It is, therefore, essential to keep all blue rays out of the operating-room. Therefore, a red verging on scarlet should be safer than one with a crimson tinge. In any case it will be impossible to attain an absolutely pure-coloured light from any known transparent medium; but possibly a little further consideration of the theory of colour may help us, at anyrate, to keep the blue rays out.

The original theory of colour—that of Newton and Brewster—was that there were three primary colours (red, yellow, and blue), and that the secondary colours were produced by the mixture or overlapping of the primaries. This theory had the great merit of simplicity and of agreeing with everyday practice, the secondary colours being imitated by the mixture of coloured pigments or the overlapping of coloured films.

This simple and beautiful theory, alas! is not now considered scientific. The same blue and yellow films which, when superposed in one lantern and thrown on the screen, produce a vivid green if placed in separate lanterns, and the blue and yellow discs allowed to overlap each other on

the screen, produce white instead of green. The fact is unmistakable, as anyone can try for himself; no experiment is easier. The colours he will have to employ—the best are said to be a solution of ammonio-sulphate of copper for the blue and one of picric acid for the yellow—are *not* pure colours to begin with, so the result does not prove much. But any blue and yellow will do and produce a fairly-white disc; so, to my mind, the modern theory of colour is based on somewhat faulty logic.

However, we have to do now rather with practice than theory, and if we can keep the blue rays out we shall be a long way towards safety. We shall have plenty of light for working, but we must not expose our sensitive plates to it more than is absolutely necessary, consoling ourselves, meanwhile, for this inconvenience with the hope that some day we may find the pure red light which will be safe. For experiment coloured gelatine films will be found easier to procure of various shades and depth of colour, as well as simpler in use. They are, I believe, always used for coloured light in theatrical work, for the reason that they allow more light to pass than glass.

Having procured a stock of different colours, the next step is to examine them spectroscopically. This sounds like no end of elaborate apparatus, but they are by no means essential. All that is necessary is a lantern (such as the sciopticon or any good paraffine-burning one) and a prism. For this a triangular chandelier drop will do, but a bisulphide of carbon bottle prism is better, as it gives a larger and brighter spectrum. A slit about one inch long by one-eighth of an inch wide is cut in a card, or black paper fastened on glass, and placed in the lantern in lieu of an ordinary slide. The prism is set up just in front of the objective, and the image of the slit, passing through the prism, is thrown as a spectrum on the screen. If, now, a coloured film be interposed anywhere on the path of the light, the spectrum will be changed exactly according to the shade of colour of the film. If it be red, all except the red of the spectrum will be extinguished, the purity of the colour or the reverse being exactly indicated by the portions of the spectrum which remain visible. A far more effective plan, however, is to allow the spectrum to remain unchanged on the screen and to examine it by holding the coloured film to the eye, noticing the portions of the spectrum visible through the film. The test is far more delicate, many of the faintest ones being clearly seen, which would have passed unnoticed if the coloured film were interposed in the path of the beam of light.

Thus examined, the paler colours will show the whole of the spectrum more or less faintly, proving that, as well as rays of its colour, white light also passes. As films of deeper colour are chosen, a point is reached where only its one colour is visible. Having, therefore, thus selected a blue and a red film, they will be found to be of such a depth of colour that through each separately all the details of a landscape can be clearly seen. One of bright yellow must also be chosen. This will cut off the blue end of the spectrum, but I have never found one which did not let the red rays pass. Superpose the red and yellow films, and the details of the landscape will be clearly visible through the two together (the sun seen through the two is yellow, *not* red). Now superpose also the blue film. The three together are as absolutely opaque as an armour plate.

It is, therefore, evident that no blue ray can possibly pass through superposed films of red and yellow, and that, therefore, such a combination of coloured glass will effectively shut out all the most active rays, while allowing plenty of light for working to pass through. It further follows that, if the red glass have a crimson tint (allowing some blue rays to pass), it can be rendered safe by the addition of red and yellow or orange medium. This is capable of further experimental proof by exposing a sensitive plate to direct light under coloured films.

Red alone should, if pure, protect the film absolutely. It is not pure, and, therefore, actinic action takes place through it to a considerable extent. By multiplying the thicknesses of red more and more protection is obtained ; but each successive thickness shuts off more and more working light, as well as actinism. Yellow alone affords far less protection, as the behaviour of the plate, when exposed to the spectrum, foretels; successive increments of yellow, while diminishing the working light, still allow a very considerable proportion of actinic rays to pass. But, by using the red and yellow together, far more working light will pass through, and the protection will be as great. To the eye, one thickness of red and one of yellow is much more transparent than two thicknesses of red; but, being opaque to the blue rays, the protection is greater.

Moral: In default of a pure red use red and yellow; the colours need not be very deep. Till pure colours are produced do not expect to get an absolutely safe light, but you may have plenty for comfort. If the window be exposed to a variable and, at times, a strong light have a third sliding pane of *pale blue.* This will diminish the light without altering its colour.

THE GELATINE PROCESS CRITICALLY EXAMINED.

By F. Howard.

Something like two or three years have now elapsed since the gelatine process passed from the region of experiment into the practical phase of daily use, both for studio and landscape work. The recent exhibition and the results in the shape of negatives and prints now in the possession of most workers enable us to critically examine the results which have been achieved.

Rapidity! This, we must all agree, has been marvellously increased. Readiness and portability for outdoor work! Again a great improvement. But, as to other results? Printing quality of negative! This is the weak point, and the one which requires all the energy of the photographic community to improve. Take an average wet-plate negative, either landscape or portrait, place it side by side with an ordinary gelatine negative on the glass of a retouching desk, and commence a critical examination of the two negatives.

Take a sharp point and scratch the surface of the wet-plate negative in the deepest shadows, and do the same in the deepest shadows of the gelatine negative. This will immediately show you how deficient the gelatine negative is in clearness of shadow, and, consequently, how difficult it is to get prints of a "plucky" character.

Density of high lights has been sought as a remedy for this, and though it be no longer a difficulty to make plates giving plenty of

density and negatives that will bear plenty of printing, another difficulty shows itself in the gelatine negative, namely, the details in the shadows become over-printed and are lost in the finished print. But without this requisite density our prints will not tone, and the washed-out appearance so characteristic of gelatine work in its earlier stages is at once apparent.

Now, having touched upon the two extremes of the gelatine negatives—namely, the deepest shadows and the highest lights—let us examine the half-tones, and here we shall find that gelatine has a strong claim to the front position; but, however beautiful they may look upon the negative, how is it that in the finished print the half-tones and details in the shadows are so deficient? I am afraid it is from this cause—that development and intensification are, though two operations for every skilful worker of wet collodion, and also two operations in every other dry-plate process, still one operation for gelatine work, having to be done in a very obscure light, and, with the same materials, development and intensification are sought to be achieved under great difficulty.

My conclusions from two or three years' working—both making, developing, and printing gelatine negatives—are that for the best photographic results we have still much more to do. It is no use to be carried away by excessive rapidity if the resulting negative is to be deficient in printing quality; and until the defects here alluded to are removed you had better ask your photographic friends to come and look at your negatives rather than at the prints in the folio.

For studies of pictorial effect (ignoring excellence of photography) a great deal may be done with gelatine; but to appreciate this a different standpoint must be taken, and the man always on the look-out for technical excellence must not be asked to look at your work. At the recent exhibition the visitor might see several charming pictorial effects, but their photographic excellence was so deficient that they were placed in comparatively obscure positions. It will be a grand day for photographers when more attempts are made after picturesque results; and to those who are, by leisure or inclination, so disposed I would recommend gelatine as likely to render better results than any process yet in use.

A small body of amateurs associated for this purpose would wonderfully help the matter forward. Not being hampered with the necessity of looking for commercial value, their whole attention could be devoted to rendering by the aid of gelatine many effects that the processes giving better technical results are unsuited for. Your yearly record of advancement in all that appertains to photography may, I hope, next year show us a great advance in this direction.

IS GELATINE WHEN BOILED IN AN AQUEOUS SOLUTION DECOMPOSED IN SUCH A MANNER AS TO LIBERATE AMMONIA?

By John Y. McLellan (Glasgow).

Up to the time of the publication of last year's Almanac I was always of the opinion that this question could, even without the evidence of

experimental proof, be answered in the negative; but in the ALMANAC for 1881, page 28, we find the Editor, in the leading article, expressing himself in unmistakable terms on this very point when he says that "one of the products of the decomposition of gelatine by prolonged boiling is ammonia." Now, it is at once very evident that this must be a question of prime importance not only to photographic but also to chemical science; for, if it be really the case that this question can be answered in the affirmative, and can be supported by experimental proof, it seems to me that the value of one of our most classical of chemical processes must in a great measure lose its value. When we remember that Mr. Wanklyn's process of water analysis depends for its efficacy as an accurate and trustworthy method of determining the purity or otherwise of drinking water by estimating the quantity of free ammonia and albumenoid ammonia contained therein, it becomes evident that if nitrogenous organic matter, such as gelatine, is decomposed when boiled in an aqueous solution in such a manner as to liberate ammonia, the value, I say, of this great process would be very much open to question; but that this is *not* the case is sufficiently attested by the fact that Mr. Wanklyn's process is now generally adopted in every laboratory in the kingdom, if not in the world. So much, then, for the importance of this question from a chemical point of view, and for the basis of our faith in the stability of gelatine when so treated.

Then, again, there can be no doubt that during the past year the practice of adding some acid—such as hydrobromic or hydrochloric acid—to an emulsion during the process of cooking has been gaining ground for the avowed purpose of neutralising the ammonia that is *supposed to be given off* during the process of emulsification *through the decomposition of the gelatine*—a practice which I venture to think is greatly to be deplored, since the addition of an acid to an emulsion cannot possibly have this effect, for the simple reason, as I shall endeavour to show, that no ammonia is liberated through such a cause; and, if it were not that it is apart from my present subject, I would very much question if an emulsion ever does become alkaline during the process of cooking, provided it be compounded from neutral and pure chemicals. But if there be sufficient proof to show that such has been the case under these circumstances, then I say this alkalinity results from the dissociation of the ammonium salt employed, and *not* from the decomposition of the gelatine by simply boiling; and I think that if experimental photographers were as ready to record their failures as they are their successes we would have ample proof of the fact that all that is necessary, so far as materials go, for the production of the highest class of emulsions is *pure chemicals*, and that tampering in any form is only fraught with failure and disappointment. But when such a high authority on these matters as our Editor has expressed himself in the unmistakable terms I have quoted, it becomes necessary for all lesser lights either to accept his statement as the fact of the case, or to experimentally demonstrate the reverse; and I trust that in accepting the latter alternative I shall meet with his approbation by proving my case.

It is well known to chemists that the most delicate test for ammonia is the Nessler's solution; indeed, so remarkably delicate is this test, that one part of ammonia in five hundred thousand parts of water can be readily recognised by its means. For if we take a gallon

of pure water and add one drop of ammonia, and of this solution take one pint and add to another gallon of water, it is evident that the ammonia existing in this solution must be infinitesimally small, and could not be recognised by the most delicate test paper; yet if a small quantity of this water be placed in a glass tube and the Nessler's solution added it at once strikes the characteristic colour, and proves the presence of ammonia.

In order, then, to prove that when an aqueous solution of gelatine is boiled ammonia is *not* liberated, I place in a glass retort (say) ten ounces of pure water in which is dissolved (say) fifty grains of gelatine. The retort is connected with a Liebig's condenser, and the gelatine solution boiled by means of a Bunsen burner. The distillate as it comes over is caught in three different tubes containing (say) two ounces each, and tested for ammonia by the Nessler's solution; and I am confident in saying that if the experiment be carefully carried out, giving all the attention and care which Mr. Wanklyn recommends in his work on *Water Analysis*, ammonia will not be detected in any one of the distillates. I may say that I have frequently repeated these experiments, varying the quantity of gelatine boiled in the water, all with the same negative results, satisfactorily proving, I think, that when an aqueous solution of gelatine is boiled it *is not* decomposed in such a manner as to liberate ammonia.

ON FILTERING GELATINE EMULSIONS.

By H. Y. E. Cotesworth.

Though the filtration of gelatine emulsion has never been a difficult operation in my hands, I imagine it has proved so with others, or we should not, from time to time, see described in the Journal mechanical arrangements for effecting this purpose.

In the first place, given a good gelatine and the emulsion properly and carefully made, there should be little need of filtration at all—certainly no closer filtration than can be performed through three thicknesses of muslin or one of cleaned wash leather, with as much rapidity as the same quantity of water could be passed through the same medium. When I hear of people fitting up special apparatus for keeping the emulsion warm and liquid while it is in the funnel, or special machinery for forcing it through the filtering material, I cannot help thinking something is wrong somewhere.

If the funnel requires to be kept warm, then, I fancy, the emulsion must have been poured into it when not far above the setting point; or if chamois leather be the material employed, then the emulsion may have been so hot as to cause the leather to shrink and close its pores. The same effect would be produced by stretching chamois leather tightly across the opening of the filter, as shown in an apparatus described in the Journal lately; then, no wonder pressure is required.

Again: if the filter cease to run when the emulsion is at the right temperature and other things all right, it is very probable there are sufficient coarse particles of bromide present to block it in a very short

space of time; in fact, the necessity for special apparatus means carelessness somewhere.

With a good, clean sample of gelatine I filter through ordinary filter paper, performing the operation after boiling and previous to adding the bulk of gelatine. This will effectually remove what few gritty particles ought to be present at that stage, and if the emulsion be again passed through one thickness of cambric, just before using, that will remove any chance impurities due to the gelatine.

PRACTICAL REMARKS ON DRY PLATES AND THEIR MANIPULATION.

By Joseph Gray.

At the present day there are in the market dry plates by a large number of different makers, and we find on trial that the plates of no two makers are at all alike when we come to use them. The reason is that they are not made by the same formula nor under the same physical conditions, as I will endeavour to explain more fully further on.

Let us take, for example, a dozen plates from each of three of the best makers. On examining them we note, first of all, that No. 1 sample has a beautiful *mat* surface, No. 2 is not quite so rough and *mat*, and No. 3 is glossy. I have assumed that in the above case the plates are specified as of the same degree of sensitiveness.

In the next place, we expose in succession a plate from each of the three samples under as nearly as possible the same conditions as to time and light, and develope each plate by the formula given with it. No. 1 developes in a minute, and we get a fully-exposed negative; No. 2 requires a minute and a-half to give an equally good result; and No. 3, after two minutes' development gives, after all, only an under-exposed negative. If, on the other hand, we develope all these plates by one and the same formula, we get the same results.

An experiment such as the above may be made by any operator, though I do not mean to say that his results will correspond exactly to those obtained in the case specified above; but, first of all, let him note the physical condition and appearance of different plates, then expose and develope under the same conditions, and he will find that there is a very important connection between these appearances and the working properties of the plate. In truth, I have long ago come to the conclusion that the physical condition of the film has nearly as much to do with the sensitiveness of the plate as the length of time of cooking; and if the proper conditions are observed to get the *mat* surface, and no hardening ingredients be added to prevent pitting, frilling, &c., the plates can be made from one year's end to another perfectly uniform and excellent.

The *mat*, intermediate, and glossy condition of the films are the result of the manner of conducting the *washing* and *coating* operations. To illustrate this:—Suppose we take a batch, divide it into two halves, take them into separate rooms, and coat one half at a temperature of 60° Fahr. and the other at a temperature of 75° Fahr., and then dry each half batch at the temperature at which it was coated. The result would be that the plates coated at 60° would be one-half more rapid

than those coated at 75°. The explanation of this is very simple. At the higher temperature, the emulsion being more liquid, the salts have more time to gravitate to the bottom of the film, leaving on the surface a stratum less rich in silver, and which is, moreover, well sealed up in the gelatine. This, of course, retards the action of the *light* and the *development*. At the lower temperature (which produces the *mat* plate) the film will set almost as soon as it is poured on the plate, and leave the bromide of silver well exposed to the action of the development.

The condition of film to be aimed at is one which is on the verge of frilling with abnormal treatment—that is to say, with pushing on the development. And the more spongy the film is, and the less the quantity of gelatine used to suspend the salts, so much the better. The nature of the image is independent of the kind and quantity of the gelatine used, but depends on the proportion of salts suspended in the film. The proportion of salts should be varied according to the season of the year. Some makers dose up their plates with salts all the year round, and the consequence is that they (I mean the plates) are so extremely sensitive that in midsummer it is impossible to expose them without getting sameness and flatness in the negative. It is such plates as these that excite the incredulity of the old-school photographer, and call forth the remark which we so often hear—"Your dry plates may do very well for portraits, but for landscapes they will never give the brilliancy of a wet plate." I maintain that this is altogether an erroneous idea. But to secure the best results a plate with a less proportion of salts must be used for landscapes, and photographers in ordering their plates should specify whether they are for landscapes or portraits.

In landscapes it is necessary to have perfectly clear glass in the shadows, and that cannot be got with the most sensitive plates made. Plates specified as of ten degrees of sensitiveness will be found almost instantaneous under ordinary circumstances on a well-lighted subject outside, and the flatness and mistiness due in many cases to over-exposure is often unfairly ascribed to *fog*. To ascertain if the mistiness is really due to fog, observe after the negative is fixed whether there be *clear* glass on the corners of the plate where it rested on the carrier. If this be found to be the case the mistiness is not due to fog.

If the emulsion has been precipitated with alcohol it retards the fixing considerably.

The conditions under which the emulsion is *washed* have a great deal to do with the nature of the film; but, as at some future time I intend to contribute a paper on this subject, I shall not discuss it at present.

I have employed the following method of developing, fixing, &c., for many years. It is applicable to the plates of any maker:—

No. 1.

Pyrogallic acid	20 grains.
Water	10 ounces.

No. 2.

Liquor ammonia (s.g. ·880)	$1\frac{1}{2}$ drachm.
Ammonia bromide	40 grains.
Water	10 ounces.

Mix together equal quantities of No. 1 and No. 2 immediately before pouring on the plate. If in developing with this you find you are

obtaining too much density and insufficient detail (due to bad lighting or under-exposure), immediately on perceiving this pour off nearly the whole of the solution, add a quantity of the ammonia-bromide solution, put a few drops of strong ammonia in the measure, pour the solution on the plate into the measure, and again return it to the plate. I will suppose that we are developing a landscape, consisting of waterfall, trees, houses, &c. Having ascertained the absence of fog by the method previously described, develope until scarcely a trace of white bromide is visible in the shadows, and as there was abundance of density in the picture before checking the development a superb negative will be obtained, full of detail and brilliancy, on fixing. With any well-lighted subject, by exposing well and using normal development an equally good result will be obtained; but, in a case where there is foliage or any objects reflecting dull or non-actinic light, it is better, in the first place, to get density and then push the shadows in the way just described. The exposure must be ample for dark subjects. This forcing has a tendency to cause *frilling* in some plates, and to prevent it put them in a saturated solution of alum for half-a-minute or more before fixing.

The fixing solution should not be saturated, but of considerable strength and always freshly made. After fixing wash for fifteen minutes under running water.

The method I adopt for reducing over-dense negatives is to take them from the hypo. bath, slightly rinse them with water, and allow them to stand with the hypo. solution on them exposed to the air for half-an-hour or more. If this do not reduce the negative sufficiently repeat the operation.

Much has been written on opaque spots in dry plates, but I venture to assert that the real cause has not yet been given. My theory is as follows, and I have frequently confirmed it by experiments :—There are some gelatines which reticulate and pit considerably, leaving a spot in the film which is semi-transparent before development, turning into an opaque one after development. This spot consists of a thin stratum of almost pnre bromide of silver, from which the gelatine has retreated in reticulating. The spot, unprotected by the film, becomes over-exposed, and therefore turns black in the development. The crucial test of the theory is that in a dark background we get an opaque spot, while if the spot be in the high lights of the picture it is scarcely seen. This I have proved to be so by numerous experiments.

I hope that these observations—which are the result of seven years' practical experience—however imperfect, may help the photographer to understand the physiology of the dry plate, and enable him to cure some of its light ailments and develope its finer qualities, without calling in the doctor or summarily dismissing so admirable a servant.

EMULSION NOTES.

By C. Oakeshott.

Emulsion making on a small scale has its troubles, and perhaps not the smallest of these is the filtering. With suitable appliances this is easy enough, but, failing these, the gelatine after pouring into the funnel is

very apt to chill and set before half has passed through. As a remedy, I have found the following simple arrangement very effective :—

Procure an empty pound coffee tin. Round the lid of this wrap three or four folds of stout brown paper, and secure the inner and outer laps with stiff paste. The paper should be wide enough to reach the bottom of the tin, and have also a little excess to fold over the top, so as to exclude all light. This forms an elongated lid, which slides easily over the body of the tin.

Now take a squat, five-ounce bottle—one of Mawson's iodising bottles answers well—and with a red-hot wire cut off the bottom. Plug up the neck with clean tow, and for greater fineness tie a piece of calico over the rim; this forms both funnel and filter. Obtain from any chemist an empty one-ounce quinine bottle, which will comfortably hold five ounces of emulsion. Wash it thoroughly, and the apparatus is complete.

When required for use, place the bottle with the funnel resting in the neck in the tin in the dark room; pour in the liquid emulsion, and leave it till as much as can has passed through. Then cover with the lid, carry to the kitchen, and place on the hob, or, better still, inside the oven, and the chilled emulsion will quickly filter through to the last drop.

A simple test for the proper washing of an emulsion, when ammonium bromide is used, is to take from the bulk a small particle, place it on a strip of glass, liquefy with heat till spread in a thin film, and continue the heat till the film be quite dry and hard. Then lay the glass strip on some damp place (a wet brick will do), and if the nitrate of ammonia be thoroughly washed away the film will remain dry and hard ; but if a trace of the decomposition salt remain the film will, in a very few minutes, become soft and tacky to the touch. I always use the ammonium salt, and cannot say if nitrate of potash would as readily deliquesce.

One source of fog—green, red, or black—is in using the same frame or even the same camera for both wet and dry plates. When so used the camera and frame absorb and retain with tenacity the nitrate of silver drainings, and these (even when dry) when brought into contact with the gelatine are sure to leave their mark—sometimes as a stain spreading from the corners where the plate rested, sometimes as minute black specks on corners, and sometimes as a thin veil extending over part or even over the whole of the plate. It is safest to have separate cameras for each process.

A FEW GELATINE EMULSION NOTES.

By J. C. Stenning.

In pouring in the silver in sensitising an emulsion an india-rubber teat over the tube of a funnel is very effective, and it will be necessary to select a teat red or black, with as small a hole as possible.

For heating plates a deep dish is filled with hot water and covered over with a sheet of glass, on which are piled up the plates. By the time the emulsion is warmed and filtered the top plate is ready, and as the pile is worked down the plates are warmer than at first, which is an advantage, as the emulsion gets cooler.

In developing I commence with one drop to the ounce of Wratten and Wainwright's formula, and as soon as the sky line or high lights are defined more is added according to the exposure and subject. Plates with a shiny surface are, in my experience, invariably slow; those with a dull matt surface quick. Plates are liable to frill for a day or two after manufacture, and a batch I put away for this reason turned out faultless when using them eighteen months afterwards. The next great step in the advance of gelatine emulsion will be doing away with the washing part of the process, and perhaps this year's ALMANAC may contain the good news.

Old negative baths need not be thrown down, but can be used for making emulsion. Some plates so made early in the past year were very satisfactory, both in rapidity and in quality. As the strength of the solution is always much weaker than that employed for the usual gelatine work, the resulting emulsion had better be precipitated with alcohol, as washing by either of the ordinary methods would make it too thin.

A slab of slate is useful to set the plates on after coating, being cool, and, besides, in a dim light the prepared plates are well visible. Old tooth and nail brushes are extremely useful to clean off the moist gelatine films when necessary. They also come in handy for getting the deposit out of developing dishes and glasses.

Rapidity seems the rage. It is curious how many methods appear to be adopted to obtain it. My experience during the past year points to a very simple means, by which already some exceedingly quick plates have been produced; still, there remains the difficulty of obtaining successive batches of equal rapidity, and this difficulty seems to increase as the lots made are smaller. The most equal results, though not the most rapid, were obtained when following exactly the formula in THE BRITISH JOURNAL OF PHOTOGRAPHY for August 22nd, 1879.

FURTHER EXPERIENCE WITH GELATINE EMULSIONS.

By S. ROGERS.

UP to the commencement of last year I had been pretty successful with gelatine plates, and here I wish it to be understood that I always make my own plates. I state this to induce amateur beginners to take courage and prepare their own plates. I used to think what an amount of trouble, time, and patience was required to make a few plates, and then, perhaps, after all, the plates would fog, frill, &c. At the same time I do not wish to lead anyone astray, and say that failures cannot be met with. I have myself, notwithstanding I have exercised the greatest care, lost a whole batch of plates. This does not sound very encouraging, it may be said; but, as a set-off, I am glad to say it is very rarely I lose a plate now, and when I do I can mostly trace the cause. Either it will be from a dirty plate or from the plate not having been properly dried in the drying-box, or from white light having got to the plate by some means or other; but these faults rarely happen.

I almost think, for a beginner, it is well for some trouble of this kind to crop up, as he then knows what to guard against in the future.

The formulæ I have principally used are one by Mr. J. Carroll and another by Dr. Nicol. I have been very successful with the working, particulars of which I gave in a former ALMANAC, and which I need not repeat here.

On receiving last year's ALMANAC I there saw the full working details of a boiled gelatine emulsion by the Editor. I thought there must be something good in it, and I thereupon set to work, made up two ounces of emulsion, followed out the instructions there laid down to the letter, and the result was a batch of the best gelatine plates I ever made.

Being fortunate in getting a fortnight's holiday during the summer months I took with me two dozen of these plates, my destination being Portsmouth and neighbourhood in order to test the latitude of these plates. I did not confine myself to accuracy of exposure. I likewise adhered to the same size of stop—the smallest but one of the lens (Steinheil's.) The first exposure was as quick as possible, without a drop shutter, the subject Portsmouth Harbour, and the result was a good negative with pyro. development. Another plate, exposed two seconds on Southsea Pier, received oxalate development, and produced another good negative, slightly thinner than the last plate. With the remainder of these plates I varied the exposures from two seconds up to eight seconds; and I must say those exposed eight seconds are the best gelatine negatives I possess. Almost all of them were developed with oxalate of potash and sulphate of iron. I am rather "sweet" on this developer, as it is more manageable in my hands than pyro. I used no bromide during development of any of these plates. The light during all these exposures was bright summer weather, with sunshine.

To conclude: I think our best thanks are due to the Editor for the excellent addition to gelatine emulsion processes he has given to the public.

A NOTE AND AN EASY PROCESS.

By "PHARMACIST."

ANOTHER season's experience with gelatine plates has convinced me that there is room for a great deal of improvement—not only in their exposure and development but also in their manufacture. I think, however, that many difficulties would be avoided by the general use of plates of but two degrees of rapidity—one of three or four degrees for ordinary use, and the other of (say) fifteen degrees for instantaneous work.

Failures occur, undoubtedly, very much from over-exposure; but more, I am inclined to think, from too much light being used during development. One thickness of ruby glass (and this, probably, not tested) for use in bright daylight is not, in my opinion, the safest of mediums. One of ruby, one of orange, and a piece or two of orange paper would not be too much.

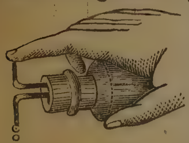
It is a great annoyance to have one's plates veiled. It is, in some cases, the fault of the manufacturers, as may be known when the veil covers the whole of the plate, including that portion which rests on the carrier or dark slide. In development I find *fresh* and *dilute* solutions much the best to commence with, as density can then be obtained with ease and certainty.

One of the best shutters I have used is a combination of flap and drop shutter made in ebonite by a Leeds firm. During a short holiday last July on the east coast I used it continually upon landscapes and seascapes, and found it all that could be desired. There is little fear of *under*-exposure with it—a consideration of some importance.

About six months ago I made a batch of emulsion as follows:—Take of—

Gelatine (Nelson's No. 1 photographic).....	100 grains.
Nitrate of silver........................	100 ,,
Bromide of ammonium....................	60 ,,
Distilled water	*quant. suff.*

This is the formula recommended by the Editor two years ago. Dissolve five grains of gelatine and the bromide in six drachms of warm water. Dissolve the nitrate of silver in four drachms (or even less) of water, and put it in a bottle having a cork fitted with two small bent glass tubes. I used one of Herbert's medicine droppers, as in the accompanying form.



The two solutions being warm drop the nitrate solution gradually into the bromide and gelatine, stirring briskly. When thoroughly mixed add the remaining ninety-five grains of gelatine, previously dissolved in a small quantity of water, and shake well. Precipitate with methylated spirit, wash the gelatinous mass in distilled water, and then remelt and add distilled water to make up the five ounces. Plates coated with this emulsion were as sensitive as Swan's marked "six times," and they developed easily and fixed quickly.

I find slight mercurial intensification the best thing to remove green fog. By the way, is this fog caused by the air passing over the plates in drying being impure? I have only met with it in plates dried by air warmed by a large kerosene lamp, which I afterwards found not altogether a sweet-smelling apparatus.

A FEW DARK (ROOM) HINTS.

By W. Horseman Kirkby.

The following hints are intended more particularly for the assistance of amateurs and beginners, but still I imagine that older workers may find some "grains amidst the chaff." I do not for a moment claim that any novelty will be found, for probably all these matters have, at various times, been made public by many writers in The British Journal of Photography; but I think that if put together in a more concentrated form they may receive attention from many who have previously overlooked them.

Mind that the light in the dark room is of the right quality, perfectly non-actinic, and have *plenty* of it. You cannot do as good work groping about in the dark as when you can see well the progress of the development. I use a commercial ruby paper, which I have found answers its purpose perfectly with either candle, gas, or daylight as the source of illumination, and plates that I have coated and developed under this light show no trace of fog.

To avoid the trouble and loss of time of weighing I always, where practicable, keep my chemicals in solutions of known strength, varying according to circumstances. For instance: I dissolve one ounce of pyrogallic acid in seven ounces of water, in which has been dissolved one drachm of citric acid, as recommended by Mr. A. Cowan. Now each drachm of stock solution contains eight grains (nearly) of pyro. When about to develope a plate a solution of any strength can be obtained by measuring out as many drachms of stock solution as the number of grains per ounce required, and making up the bulk to eight ounces with water. For example: if I wish for a three-grain solution I place three drachms in an eight-ounce bottle and fill up with water.

As to the ammonia-bromide solution: I do not like those formulæ which require it to be added in equal bulk to the pyro.; for, should the first application not be correct and more ammonia-bromide be required, its addition so weakens the pyro. that the result is probably a thin negative. I prefer a strong solution, which is then added by drops, or, more correctly speaking, minims. It should always be measured in a minim glass. Never trust to dropping, for drops vary from many causes—the shape of the vessel, the specific gravity of the liquid, the rapidity of dropping, &c.—all making a difference. If photographers were more careful on this point and more precise in the quantities used we should hear of fewer failures.

Hyposulphite of soda is best kept in a saturated solution, when, roughly speaking, an ounce of the fluid contains half-an-ounce of hypo.

Solutions of different strengths and of other substances according to requirements will naturally suggest themselves to the reader.

The subject of residues is not, I think, sufficiently attended to, for with little or no trouble a large percentage of the silver can be recovered. A little common salt will throw down as chloride the silver in the water used for washing prints before toning. The fixing solutions—used both for prints and also for negatives—should be poured into a jar containing either scrap or bar zinc, when in a short time the silver will fall to the bottom in a state of powder, which, with the chloride from the washing water, can be sent to the refiner.

STRAY THOUGHTS ON EMULSION.

By George Dawson, M.A., Ph.D.

There is nothing within the bounds of our beloved art-science which, at the present time, is more conspicuously amusing and often bewildering than the infinitely-diversified instructions which are being continually promulgated—First, for the preparation of sensitive gelatino-bromide emulsion; secondly, for the exposure; thirdly, for the development; and, fourthly—most lamentably diversified of all—for the intensification of the negatives, when that operation is deemed necessary.

If we could only induce our minds to consider these questions by the light which science has already thrown over the *rationale* of the various processes, there would be far less difficulty in estimating the true value of this or that chemical and physical power in modifying, controlling, or even altogether changing, the results which the photographer aims at accomplishing. I do not mean by this to assert that an intimate know-

ledge of chemistry and its laws are absolutely necessary to the formation of an expert practical photographer, although such an acquaintance is decidedly useful in many respects, more especially if he be thrown much on his own resources and has to prepare and mix up many of his own solutions; but because with that knowledge implanted in his mind he will be able more clearly to see and appreciate how certain external influences, such as temperature, &c., tend to modify the normal conditions of composition and decomposition of those bodies with which he is operating.

In no department of practical photography is this chemically-discriminating power of greater importance than in working out satisfactorily the manifold details connected with the preparation of gelatine emulsion plates, and bringing them to a successful issue in the shape of sparkling negatives. Most assuredly the professional preparers of dry plates are now having a long and successful innings, scoring "lots of runs" in the shape of golden eggs laid by the photographic geese who gobble up their *pabulum*. But why should not the photographer make his own dry plates, and thus render himself independent of the (too often) unreliable supply afforded to him, by at least a few professional plate-makers?

The preparation of gelatino-bromide dry plates is exceedingly easy—greatly more so, while being, at the same time, vastly less messy and offensively troublesome—than the manufacture of pyroxyline and collodion, with the after necessary abominations attendant on the latter. Moreover, the digestion of gelatine emulsion can very conveniently be going on in one's sitting-room, whilst the operator may be looking after other duties which require his attention. It is true that great care is requisite—first, in measuring or weighing out the necessary chemicals; but every photographer, from the nature of his calling, should be handy at these operations. Then the digestion goes on with but little attention, if preliminary precautions be taken as to the continuous regulation of the heat applied. The washing and filtering of the sensitive compound are also very easy matters. The arrangements connected with the coating and drying room are those which require to be most carefully carried out, so as to ensure plenty of working space with freedom from dust and uniformity of temperature, including a safe light whereby to conduct operations. Now, such arrangements should not in the least interfere with those of the studio or of outdoor photography. The preparation of gelatine plates can proceed quite as satisfactorily at night as by day, and thus many spare or idle hours of the photographer's time might be utilised greatly to his own satisfaction and profit.

The careful instructions which from time to time have been published by disinterested and highly-competent experimentalists leaves no one an opportunity of pleading ignorance, either as to the principles involved in the manufacture of dry plates or as to the means by which these principles are made subservient to actual practice.

GOOD PLATES AND HOW TO MAKE THEM.

By Benjamin Wyles.

Many as are the formulæ and instructions for gelatine plate-working, it remains a fact that many gentlemen of ability and intelligence have

found failure the rule and success the exception in their efforts. For the sake of those who would know what they are using, and be able to practice "self-help," the following jottings are put together, and any-one with intelligent care may, on similar lines, prepare plates for their own use.

It must be remembered that from the same ingredients may be made at will either the slowest or quickest of plates, the difference being due to—first, time; second, heat; and third, ammonia.

A convenient cooking vessel is the common two-inch brown preserve jar that has a lid dropping into the neck. In it is placed—

Bromide of ammonia (Johnson and Son's make)	260 grains.
Gelatine (Henderson's)....................	60 ,,
Water	4 ounces.

This is set in a pan of water and placed over a ring burner.

Silver nitrate	400 grains,
Distilled water	4 ounces,

are put into a glass flask, and the flask immersed in the same outer pan of heating water.

With an occasional shake, by the time the water is "hot," the ingredients in both vessels will be dissolved. How hot the whole should now be and *kept* we will speak of by-and-by. The mixing is performed by pouring the contents of the flask into the brown jar in a thin dribble, stirring thoroughly with a glass strip or silver spoon all the time. The brown jar is replaced in the pan of hot water, and kept at as near one temperature as possible for the time desired, which time will depend on the sort of plate desired. Suppose a good "general use" plate be required, which will give *any* amount of brilliancy and work tolerably quick: digest at 130° for an hour and a-half. Whilst this is digesting weigh out 240 grains of Henderson's gelatine, soak in cold water, melt, and at the end of the time of digesting pour into the emulsion. Set the jar at once in *cold* water until it is cooled to from 90° to 100°, when one drachm of strong liquor ammonia may be added and the emulsion left to set.

Washing is done by squeezing through a canvas bag on to two thick-nesses of muslin tied over a wood vessel, and after soaking in two or three changes of water (say) half-an-hour the emulsion is gathered up with a silver spoon and re-melted. At the same time 300 grains of Nelson's No. 1 gelatine, previously soaked, is melted and added. An ounce or two of methylated spirit appears to make it spread easier. The whole bulk is made up to twenty-five ounces, when it is run through wash-leather (well cleaned with soda), and is ready for—

Spreading.—This is simply done by running the emulsion through a *pure* rubber tube, with a clip at the end held in the left hand, the emulsion being guided over the plate with a glass rod held in the right. The tube is attached to a glass holder surrounded by a metal jacket containing hot water, which is simply hung up over the glass slab.

Drying is an important part of the programme, and discouragement is likely to be met with if it cannot have a fair chance. A drying-box will do for a few, but the writer soon found it desirable to partition off the end of a large dark room, making a sort of inner dark room of it, with a self-acting door. Cold air constantly comes in through an open-ing from the outer air, and, passing through stove piping into a sheet

iron stove containing a ring burner (the products of combustion never entering the room), passes out at openings made at three different heights into a chimney. It is wonderful what a draught there will be in a small room arranged in this manner, even without the help of the stove. Plates may be dried spontaneously, if preferred, and it proves a very useful adjunct for negative drying in damp weather.

If care be taken not to submit the gelatine to more heat than is necessary, either in cooling or drying, little fear need be entertained of frilling or other defects; but to make sure one-twentieth to one-tenth of a grain of chrome alum per ounce may be added. Adding more than one-tenth I find introduces imperviousness of the film and *apparent* slowness.

Bromide of potassium may be used in the proportion of four to five of silver, if preferred, to the ammonium salt. I have used both quite successfully, but have settled down now to the formula just given. For the proportions of the salts I am indebted to my old friend, Dr. John Nicol, and, having gradually worked out a system of producing any sort of plates from it by variation of treatment, I can recommend others to apply a part of their winter leisure to the same course.

DEVELOPMENT OF GELATINE PLATES.

By W. D. Richmond

The possession of a lantern armed with deep ruby is reckoned by some as a *sine quâ non* in development of rapid gelatine plates. Let such ponder over a little of my experience.

In the days of collodion emulsion—which might be much more used than it is in the studio—I have frequently finished the development of a plate (alkaline method) *by the same light I used to print it by.* I have not tried this with gelatine, because in this a dish is used, while with collodion the developer was poured on.

Now, my favourite developer is the ferrous oxalate, and on a late trip into the country I armed myself with a dozen plates of a well-known make, quite equal to drop-shutter exposures under proper conditions. I took no chemicals, relying on a photographic friend for development facilities. He kept ready for use in two bottles spirit and pyro., ammonia and bromide. I did not like the result of this as used in his hands, and, not caring to upset his arrangements, I inquired for some ferrous oxalate materials. He had none!

It was in a little country town, and no potash oxalate to be obtained. I procured, however (as nearly every druggist is sure to keep them in stock), some oxalic acid, carbonate of potash, sulphate of iron, and bromide of potassium. Thus armed I sought my hotel, mixed up my solutions, and prepared to develope the rest of my plates. I thought of improvising a substitute for ruby light, but considered I might manage equally well without it. I got my mixed solutions of potash oxalate and ferrous sulphate in one dish, and some water, &c., in others. I turned down the gas very low, but could easily see what I was doing, removed the plate from the dark slide, put it in water for a minute, and covered it up. I removed it then to the developer, and, trusting to its red colour, turned up the gas so as to easily watch the development.

Keeping my eye on the "darks" I developed until the deepest shade—as under a shed, for instance—began to change in colour. The result was plenty of density without a trace of fog. The sensitised paper showed distinctly white through shadows when in the pressure-frame. The rest of the plates developed equally clean, and showed none of the yellow-green stain so familiar in pyro. development.

Of course my friend, *the photographer*, easily supplied me with hyposulphite of soda. Thus it was I developed the plates on my last attempt at outdoor photography after an interval of about twenty years, former experience in that way being confined to waxed-paper, &c., and a modified Fothergill process. I am pretty well up in the use and manufacture of gelatine plates for photolithography, and can usually get sufficient density without intensification of any kind. My experience of the ferrous oxalate developer was therefore considerable, and gave me the confidence that I could work without my usual ruby light.

The moral to be gained is this:—If a gaslight is not to be had use a candle, remove it to a good distance while the plates are removed from the slide, and you may safely approach within a foot of such candle when the plate is under the developer. Further: I may say I should not fear pyro. under similar circumstances. When we remember that light decreases as the square of the distance we possess much power over it if we do not work in the little, poky dark room used by ordinary professional photographers. To those who use such a room I should recommend the shutting out of daylight entirely and the use of a lantern, as giving a greater equality of light. Though I have a good large room to work in, lighted by orange paper, I always prefer a lantern to develope by, on account of its greater regularity.

A FEW THOUGHTS ABOUT GELATINE PLATES.

By R. R. Brown, Jun.

As gelatine plates are now so much used by photographers, both professional and amateur, a few words about them will probably not be out of place in this handy little volume. To begin at the beginning. Is the manufacture of emulsion and plates suitable work for the photographer? I think not; because the plates can be bought almost as cheaply as they can be made, and, what is of much greater consequence, of a much better and more uniform quality.

It stands to reason that the professional manufacturer of plates—who turns them out, one might say, by the thousand, and who has proper buildings especially adapted to the work—must produce a better article than the photographer could hope to do. An artist might as well grind the colours and make the brushes he uses.

I will not say, "Do not study the manufacture of emulsion and plates," because I think it behoves every photographer—professional and amateur—to have a thorough knowledge of this important subject, so as to be able to make them himself at any moment should such a necessity arise. Study this branch thoroughly, theoretically, and practically; for, if you do not understand the making of them, how can you expect to understand the after-working?

My experience of the various makes of plates with which the market is stocked has proved, at the end of a season's work, to be diametrically opposite to what I supposed at the first it would have been. I find that some of the cheap makes (up to a certain size) are quite as good as the more expensive ones.

Most of my work this season has been of the instantaneous class, which is now reigning in such a despotic manner over photographers. I have used a drop shutter, plain and simple, fitting on the hood of the lens, having an adjustable opening, and working in about the tenth part of a second.

It may appear strange to those who have been accustomed to work with the "rapid" class of lenses to hear that I have never in one instance used a more rapid lens than the portable symmetrical. In some instances of taking breaking waves I have used the third stop, and have not lost half-a-dozen plates throughout the season by under-exposure. The great advantage to be gained by using this class of lens is that there is not a falling off of definition towards the corners of the pictures.

Regarding the development of gelatine plates: I never could understand how any strictly-set formulæ for developers could be suitable to all makes of plates. I have used a developer in which the pyro. was dissolved in spirit, and with a certain make of plate I could get any sort of negative I wished with it—either hard or soft—while with another make I could only get poor, foggy negatives, totally unfit for printing.

I have found the use of a solution of alum and citric acid of great use. It effectually clears off all yellowness from a developed plate, caused by too long immersion in a discoloured solution of pyrogallic acid.

It is a wise precaution to soak the developed negative in a strong solution of alum previous to fixing, but this I have not found absolutely necessary. I always use alum after fixing. It destroys all traces of hypo., and in a measure does away with the necessarily long washing that the films have to be subjected to.

When I was troubled with frilling I tried soaking the plate, after exposure and before development, in a weak solution of chrome alum, but found it had a tendency to cause mottled markings on the film; also, if the plate were not lowered steadily down into the solution a sharp line was caused, just as in the old wet-plate times when a plate paused during its journey into the mystic depths of the silver bath.

There are many complaints made about mercurially-intensified negatives fading; but I have many a dozen intensified in that way, and not one shows the least sign of changing colour. I believe that the whole of the mischief is caused by too little washing. Most of the diseases that gelatine plates are heir to may be remedied by the cold water cure. You cannot wash the emulsion or plates too much, especially between fixing and intensification.

The formula for intensifier that I prefer is the cyanuret of silver, and not the ammoniacal one. With the former you get a purple tint very non-actinic, and by its means I have saved many an otherwise worthless negative.

I cannot say more now on this interesting subject—not because I have "run dry," but because I guess our friend, the Editor, has a pair

of huge scissors handy. But there is one subject about which I should like to say a few words. If any amateur wants some real fun let him do what I did during the season. A bazaar was held in my native town, and I was asked by a friend (one of the officials) if I would give some photographs or do something to help them. The former I could not do on the short notice he gave me (only one day); so I went down and inspected the hall where the bazaar was to be held, and found that it opened out into a conservatory, which I managed to turn to good account. I sent my dark tent, camera, lens, and a box or two of ferrotypes, mats, and preservers, and "took" all who were willing to honour me with a sitting. My prices ranged from sixpence to half-a-crown, according to size and finish. Colouring (done in half-a-minute) was charged sixpence extra. The bazaar lasted two days, and I cleared £2, so I did not do so badly. I had endless fun, especially with *babies and pet dogs.*

In drawing this article to a close I can only add that it is my fervent wish that those who have done so much to elevate photography from the mere mechanical affair it used to be to the high standard it has now gained, may by their aid raise it to that state of perfection that no one shall dispute its place among the fine arts.

As a parting word I would say to one and all—Strive to emulate those who have shown what our beautiful art-science is capable of doing. Study art, and do not set your whole affections on the dark room and its contents. Do not be satisfied with a mere technically-perfect *photograph*, but aim at making it a *picture* as well.

In conclusion: I wish to all my readers and to our friend, the Editor—

A HAPPY AND PROSPEROUS NEW YEAR!

CLEARING GELATINE NEGATIVES.

By J. COWELL.

ALL dry plates developed with pyro. ought to have the benefit of a clearing solution. There are many that will be found useful, but the following has given the greatest satisfaction in my hands :—

After fixing wash well, and either flood or immerse in a solution of citric acid about one or two drachms, alum about half an ounce, and water ten ounces. A very few minutes in this will greatly improve the printing quality of the negatives.

Afterwards well wash and immerse in a dipping bath of alcohol. This is very important, especially in damp weather.

INTENSIFICATION OF GELATINE NEGATIVES.

By J. H. T. ELLERBECK.

THERE is "nothing new under the sun;" but possibly a reminder of what has already been published on intensification may be useful to those who keep the "annual" for reference, but not the "weekly."

Some time ago I accidentally over-exposed a plate which, when developed, gave so thin a result that it was put aside as useless, the image being hardly visible. This was then soaked well in citric acid and alum solution, washed, and treated with silver. The intensifier was

according to Pollitt's formula. Result: still thin and unprintable. After thoroughly washing in the water and cleaning with the hand or cotton wool, treat with the usual mercury solution and ammonia, and the result will be a strong brown negative almost too dense for November weather, but clean all over. The first silver seems to give a base for the mercury to build upon.

There is no necessity for using both silver and mercury upon an ordinarily-weak negative, as either one or the other suffices; but for specially thin and nearly invisible ones the effect is almost magical.

EMULSION NOTES.

By J. M. Carroll.

A good degree of sensitiveness to select for a standard to keep plates at is ten times wet collodion. By doing this we have either a rapid or a slow plate, according to our requirement. For instance: in a great deal of outdoor work, copying, &c., a slow plate will be found the best—that is to say, the easiest to expose and develope correctly. It, perhaps, will not be known to all that a rapid plate may be converted into a slow one, but that a slow one cannot be changed into a rapid one. To explain this: say we expose a plate of ten times the sensitiveness of wet collodion, and, instead of giving it one-tenth the exposure of wet collodion, we allow it five-tenths or one-half. By using a suitably-slow developer we get good negatives not showing any over-exposure, with the advantages of being able to use a comfortable amount of light during development, and clear shadows, even if at its full rapidity the plate was of bad quality. The restrainers we have at our disposal are not very numerous or efficient, but they can at least accomplish this degree of reduction of sensitiveness.

There is a field for discovery in this direction as to what influence various chemical compounds added to the developer would have as restrainers or on the photographic representation of the colours of the object. We know that a bromide film is differently impressed by certain colours than an iodine one, but we have not yet found out whether a bromide or iodide will give us as pleasing a representation of the colours of nature as it is possible to obtain.

My favourite restrainer for some time past is chloride of ammonium. It is much more powerful than bromide or iodide, and does not protract the operation of development in the same manner. Bromide appears to me to have little or no effect in reducing the detail and blurring consequent on over-exposure, but to simply lengthen out the development to an intolerable extent. Chloride is totally different, is perfectly under control, and accomplishes its purpose as a light destroyer. How would bichromate of potash act as a restrainer in development, it being, in common with the haloids, a known destroyer but more powerful of the latent image? I will here give the formula for a slow developer:—

No. 1.

Pyro	½ ounce.
Salicylic acid	10 grains.
Distilled water	40 ounces.

No. 2.

Liquor ammonia *fortis*	½ ounce.
Chloride of ammonium..................	6 drachms.
Water	40 ounces.

Wash the plate, and apply equal parts of Nos. 1 and 2. They will both keep indefinitely.

Having tried all the various modes of eliminating the useless salts from emulsion, including the very latest—and, by-the-bye, some of them look very nice in print—I still adhere to our old friend, dialysis, which in practice beats them all. The dialyser should be made into a permanent tool by stretching a piece of calico over the parchment paper. Mine has lasted six months, and is kept in a dark cupboard, with the emulsion, filters, &c., all of which are ready at a moment's notice. I mix the emulsion four times concentrated, with just enough gelatine to secure the requisite fineness, dialyse, add one to ten of pure alcohol, and bottle in two-ounce phials. I have little doubt that these will keep for two years and be as good the last day as on the first, but I have not tried them longer than twelve months.

As an instance of how emulsion will keep, I prepared a quart of finished emulsion last December—one in ten of pure alcohol. The stone jar containing it has been heated for the purpose of using a portion, often up to the boiling point, over a dozen times. It is now fluid, and has a distinct sour odour; but upon adding fifteen grains of fresh gelatine per ounce its working qualities are perfect, the only difference being that it is probably a second or two slower in a fifty-seconds' exposure. The drying of plates by methylated spirits will be found very useful in wet weather, or in any case where a batch of plates are required in a hurry. I find three baths of a pint each cost one shilling and sixpence—sufficient to dry 100 $7\frac{1}{2} \times 5$ plates. Do not give less than five minutes' immersion in each bath. The plates dry in twenty minutes, and are in no way different from those dried in the ordinary way. The third bath may be kept and used as the first bath for a future batch.

As we improve our acquaintance with gelatine emulsion one is slowly but surely impressed with the fact that it is, indeed, a very accommodating compound. At one time I had great difficulties with the setting, owing to variations in temperature, cold being the hardest to deal with; but now, by regulating the amount of gelatine—from as high as forty grains in very hot weather down to ten grains during frost—the trouble has disappeared, and that without any very noticeable effect on the result. A useful hint, which workers will, no doubt, appreciate, is to cover the setting shelves with sheets of ordinary glass, allowing about an inch to intervene.

A FEW HINTS AS TO GELATINO-BROMIDE EMULSION.

By J. H. Storr.

In my method of working the above process I find that bromide of potassium is the most suitable salt to employ, having got very rapid plates with fifteen grains of this salt to the ounce, twenty-five grains of gelatine, and twenty-one grains of nitrate of silver.

I dissolve the bromide in one-quarter of the water and one-quarter of the gelatine in that solution, and the silver in the remaining water, heat both to about 100°, and mix; then boil for twenty minutes, in which, after boiling, I place the remainder of the gelatine dissolved in as little water as possible; shake up well, pour out to set, and proceed to wash in the usual way. After being remelted, for coating the plates I add ten drops of a saturated solution of chrome alum to the ounce of emulsion, and this addition I find hardens the films considerably, so that the copious washings they require may be proceeded with without any fear of disaster. Develope with—

Washing soda	2	ounces,
Water	20	,,

into which, before flowing on the plate, add a few drops of a strong solution of pyrogallic acid and alcohol and fix in hypo., one ounce to five of water. A very copious washing must be given to the plate after development and fixing, or the salts will not be dissolved out, and, in that case, the plate would be destroyed.

For cloud effects mix a little ink and gum together, smear the sky portion of the negative as fancy dictates, and some very pretty effects may be made.

GELATINE PLATES.

By Charles W. Folkard (Associate Royal School of Mines).

Having been fairly successful with home-made plates during a recent trip in the country, a few notes on the details of the process worked may possibly be found useful by my brother amateurs in landscape work. The formula is that given at page 46 of The British Journal Photographic Almanac for 1880, by Mr. Manfield; and, for the convenience of those who, like myself, prefer the French weights and measures, I give it altered to that system:—

Emulsion for Twenty Quarter Plates.

Potassium bromide	2	grammes.
Gelatine	3·2	,,
Water (common)	32	c.c.

The above is to be left in a two or three-ounce flask for one or one and a-half hour, and then the gelatine is to be dissolved by immersing the flask in warm water. Nelson's "patent opaque gelatine" answers quite as well as "No. 1."

Silver Nitrate Solution.—This should be kept in stock, as uniformity is thus secured. Another sample with more free acid would, *cæteris paribus*, give slower plates, &c. My solution contains ten per cent. of metallic silver by weight, and the proportions are 15·74 grammes of silver nitrate made up to 100 grammes with distilled water. For the above number of plates, 17·7 grammes (not c.c.) of this solution are weighed into a small beaker, made warm (not hot), and used at once.

Mixing.—This is, of course, done in the dark room, and a single thickness of ruby glass with a candle, lamp, or gas is much safer than daylight with two thicknesses of ruby. The warm nitrate of silver solution is added by two or three c.c. at a time to the warm gelatine and bromide, with constant agitation. The easiest way to do this is to hold the flask in the left hand, and to suck up the silver solution into a glass

tube three-sixteenths of an inch internal diameter and ten or twelve inches long, and drawn out to a jet at one end held in the right hand. The top of the tube is closed with the forefinger, and it is inserted in the neck and the solution run into the flask, which is to be swirled round vigorously all the time. The flask containing the mixture is then put in a tin canister one-quarter full of water, provided with a well-fitting lid.

The canister is heated by a small gas flame one-eighth of an inch high or thereabouts (or by a night light), keeping it just perceptibly warm to the hand for seventy-two hours. It must not be allowed to remain *hot*, though this will do no harm for a short time; also, if the gas should go out for a few hours, it is only necessary to allow for this in the prescribed time for heating. It will be found much better to regulate the gas supply to the small flame by an ordinary tap than by an india-rubber tube and pinch-cock, as there is then much less chance of the gas going out during the night, when the pressure is reduced by the gas company. My usual practice is to have a look at the flame about dusk, and turn it down if the canister feel hot, turning it on again just before going to bed. By a little practice it is quite easy to do without a regulator.

At the end of the three days' "cooking" the canister is taken into the dark room, the flask taken out, shaken round, and the contents poured into the dialyser and dialysed for twelve hours. The dialysing arrangement consists of a jam pot, six inches in diameter, with the bottom knocked out, and a sheet of parchment paper (vegetable parchment) tied over the mouth. The dialyser rests on three clay crucibles or other supports (say) one and a-half inch high, by which means the parchment paper bottom of the vessel is raised one and a-half inch from the bottom of the earthenware pan in which it stands. Warm water is poured into the pan till it just touches the under side of the parchment paper, and everything is then ready to receive the "cooked" emulsion from the flask, which is poured on to the parchment paper. The bottom of the jam pot (if broken out in one piece) is then put on, and finally the cover is placed on the pan, which is heated by a small flame (about three-eighths of an inch high will probably do) for twelve hours. Of course it can be done in daylight after the cover is on. At the end of the twelve hours (by which time all the potassium nitrate will have passed out into the water) the pan is taken to the dark room, and the emulsion poured from the dialyser into a beaker containing one gramme of dry gelatine, which had better be "No. 1" if the operator be in a hurry, as the ordinary "opaque" takes one or two hours to swell.

After the lapse of half an hour, if No. 1 have been used, or one or two hours with the other, the beaker is put in the pan of water and kept warm for an hour or two till all the fresh gelatine is dissolved, and the emulsion is then filtered through clean wash leather which has been washed in warm water and soda (not hot, or the leather will shrink and become thick, causing great delay in filtering). The easiest way to filter it is to put the stoppered bottle which is to receive the filtered emulsion in the pan of water, the funnel and wash leather being in the neck of the bottle. It is thus kept warm while filtering, which takes about a-quarter of an hour. Finally: to the warm filtered emulsion add six c.c. of methylated spirit.

The plates are cleaned with French chalk, a little being sprinkled on and rubbed well. Just before coating each plate is dusted with a flat camel's-hair brush. Two and a-half cubic centimetres (measured by a tube like the one used in mixing, and having a dot of marine glue showing the length two and a-half c.c. ought to occupy) of the hot emulsion, to which has been added one and a-half drop of a one-in-thirty-two chrome alum solution, are run on each quarter-plate (which need not be warmed), conducted to the edges by the tube, and immediately put on a level slab or glass plate to set. This will take place in an hour (unless the weather be very hot), and the plate can then be reared on edge in a light-tight box containing a basin of oil of vitriol to absorb the moisture. If put in a warm place (on a mantel-piece, for instance) the plates will be dry in twenty-four hours, provided the acid be strong. It must be boiled down till it fumes after each time of using to drive off the absorbed water, or fresh acid used.

Results of Experiments with the Plates.—A set but undried film gives a much coarser image, which appears foggy and not properly focussed. It also takes ten times as long to develope and fix, and the undried part will not intensify by—

Mercuric chloride	2 grammes,
Ammonic ,,	2 ,,
Water	48 c.c.,

followed by cyanide of silver dissolved in the least possible quantity of cyanide of potassium, which seems the best intensifier where the negative is nearly strong enough for printing. So the plates cannot be used immediately after coating, but must be dried.

If a large stop be used in the lens the image is blurred, and orange paper at the back of the plate is of no use. The only cure is burnt sienna painted on the back of the glass, which has the further advantage of increasing the density of the image, and so dispensing with intensification. This was proved by backing one-half of a plate only and comparing the two halves.

The above require about twice the exposure of a wet plate, and I can quite endorse Mr. Manfield's opinion that they are as near perfection as possible for landscape work. The plate, having been flooded with water and left to soak for one or two minutes on a developing stand, oxalate of iron developer one to twelve, with the addition of a little bromide is poured on, viz., three c.c. of saturated solution of neutral oxalate of potash, one-quarter c.c. of saturated solution of sulphate of iron, and two drops of a ten-per-cent. solution of bromide of potassium for a quarter-plate. The high lights come out in twenty or thirty seconds, and the development takes five or ten minutes. If under-exposed add one-quarter to three-quarters c.c. more iron solution.

In very cold weather Edwards's pyro. developer seems to work more satisfactorily than the above; but the great advantage of the oxalate is that it never stains the film, even when the development is forced, and so the negatives print much more quickly than when pyro. is used. If the developer be left on the plate for a-half or three-quarters of an hour (in cases of under-exposure) detail continues to come out, and if any solid deposit of oxalate of iron should form on the film it is easily brushed off; whereas with pyro., the brown stain being in solution, penetrates the film, giving a very slow-printing negative.

The fixing solution is hyposulphite of soda ten grammes, water forty c.c., and the last traces of hypo. must be got rid of by prolonged washing or soaking in two or three changes of water—say for twenty to thirty minutes. The same remark applies to intensification, as the gelatine film is very retentive, and, unless all the soluble mercury salt, &c., be washed out the negative is stained.

LAST YEAR'S CONTRIBUTION REVISED.

By Archer Clarke.

In looking over my Almanac article for 1881—a proceeding I venture to suggest to some of the other writers, especially when half a promise has been made to further describe some point of practice—I will now make one or two amendments which further experience has enabled me to suggest.

First, when liquid ammonia is added to the nitrate of silver previous to mixing the same with the gelatine and bromide, there does not appear the necessity to use the same degree of care as in the ordinary English plan in order to obtain the nitrate silver in that fine state of subdivision that a spray-producer or a funnel drawn to a point gives. It is sufficient if one solution be poured into the other; and in this case equally good results follow whether the bromide be poured into the silver or the reverse, so long as the solutions are well stirred as the bromide of silver is formed.

Second, the supposed necessity to set the emulsion in a flat, open dish is now to a great measure exploded. If left to set in any cylindrical vessel—either opaque, as a salt jar, or a glass beaker (even one up to five or six inches in diameter)—both answer remarkably well; when thoroughly set, if some cold water be run on the top of the emulsion and with the forefinger just loosen the edge all round, it will turn out in one piece, just like a *blanc-mange*, and is then ready for breaking up and washing.

To do this the adaptation of the brawn-presser, as shown by the writer at the late technical meeting of the South London Photographic Society, is one of the readiest means, and a description of the same may be interesting to those who were unable to attend that meeting. To an

ordinary presser solder a fine copper wire gauze, sixteen to the linear inch, *inside* the presser at the bottom; then solder a ring of tin about three-quarters to one inch wide over the wire mesh, so that in looking through the presser a similar appearance is presented as in the diagram. Then to the outside fasten two handles of metal to support it over the wooden box the emulsion is washed in. If desired a piece of fine canvas can be placed in the box before inserting the presser, and the emulsion squeezed into that; and if a hole has previously been bored near the bottom of the box the same will form a washing trough as well.

Third: I am inclined to modify my opinion that prolonged or excessive washing causes a thin but more sensitive plate, and put down the increased sensitiveness to the extra time the emulsion has to be kept in order to give the longer washing.

Keeping Emulsion.—On the festival of St. Guy Fawkes I coated some plates from an emulsion made in March or April last, and on November 22nd I photographed over 100 children sitting at their desks in a school room, every head quite free from movement. The precautions observed were that the emulsion was thoroughly washed, then remelted at a low heat, and, when sufficiently set, methylated spirit added to about half-an-inch deep on the top, the whole (forty ounces) being kept in an earthenware jar with a cover in a cool ventilated place. The plates used about November 9th frilled a little, but on November 26th there was no sign of frilling, and a better plate I do not desire to use. I forgot to say the emulsion was boiled half-an-hour, and hydrobromic acid added just before boiling.

"We learn upon a hint.
We find upon a cue."

VISIBLE PRINTING ON GELATINO-BROMIDE FILMS.

By Richard Parr.

During the past year I have been working at the preparation and washing of silver bromide before its addition to gelatine. So far I have not been able to secure by ordinary working a sufficiently-fine grain to bear enlarging fifteen or twenty diameters, and as I regard this as a *sine quâ non* for small plates I have come to the conclusion that it is not possible. Of course it *can* be done by using very dilute solutions of silver and bromide; but such may, I think, be regarded as more fitted for a laboratory experiment than for practical work.

On preparing silver bromide from pure bromine and silver oxide proceed as follows :—Saturated solution of bromine in distilled water, three drachms; glycerine, one ounce; gum arabic, three drachms; and water six ounces. Mix, and then ten grains of silver oxide (made by precipitating it from a dilute solution of silver nitrate by a solution of caustic potash) are added and shaken at intervals for six days; then, well washing and adding to a solution of gelatine, I obtained an emulsion of a light-grey colour (ruby by transmitted light) which printed under a negative by daylight to a dark iron-grey, but refused to develope by either alkaline pyro. or ferrous oxalate. On digesting some of the bromide in ammonia solution (s.g. ·880) half-an-ounce, and water half-an-ounce, at a temperature of 100° Fahr. for fifteen minutes, it became several shades darker, and was about one-half as sensitive as a wet plate, but it printed under a negative in daylight to a slaty blue.

I next prepared some bromide by dissolving ten grains of silver nitrate in one ounce of distilled water, precipitating it with a solution of Howard's bicarbonate of soda, washing, and then adding it to a mixture of distilled water one ounce and saturated solution of bromine two drachms. After shaking well three or four times a day for three days I washed and emulsified it, and secured an emulsion of a light primrose colour (dirty green by transmitted light), which printed in daylight to a dark coffee colour, but was reduced very slowly by the alkaline developer without fog. Some of the same bromide, boiled in a solution of ammonia ·880 half-an-ounce, and water half-an-ounce, for ten minutes gave an emulsion of a cold green-grey, and printed to a dark violet, being as sensitive as a wet plate without fog.

There is nothing in this likely to be very useful; but, as I am not aware that silver bromide has been found to print out by daylight before in this way, it may perhaps be thought worthy of mention in the ALMANAC.

THE ADVANTAGE OF HOME-MADE DRY PLATES.

By L. Dixon.

SCARCELY any photographic topic has created more interest for some time past than gelatine dry plates. Before Mr. C. Bennett revealed to the profession his valuable discovery how to make rapid dry plates no one would have prophesied the change that has taken place from the use of wet to dry plates ; and ere this few will have failed to have found the benefit both as a new power for accomplishing certain species of work that could not possibly have been attained with the wet, as well as a pecuniary benefit. Still, I believe the bulk of photographers might reap more benefit if they would make their own plates. By so doing we should better understand the special class of dry plate that would suit our requirements; we should also be able to keep in stock any size to suit our convenience, to say nothing of the saving that would be effected to that class who could do with a little more work. There is often some period of the year when one can spare time to devote to this purpose.

It is an easy matter for me to make a gross of quarter-size plates in a day, and follow the general studio work as well. I can superintend the cooking and other operations during the day and coat the plates in the evening. I should estimate the cost of my plates to be not more than sixpence per dozen. Now the average cost in the market will be near two shillings per dozen; thus I have made eighteen shillings, if the operation has been successfully performed, for my day's labour. Ventilation must have the greatest attention. I have had more failures on that account than any other, not only during the drying of the plates but during the time of cooking, &c. The drying-box or room should be warmed up to 60° Fahr.

My method of preparing these plates has nothing new to recommend it, but is merely what is published from time to time in the journals. If my remarks are not already too long I will give the formulæ I use, which enable me to make dry plates equal to any I have hitherto bought in the market:—

Nelson's gelatine	50 grains.
Bromide of ammonium	130 ,,
Water	5 ounces.
Silver	200 grains.
Water	4 ounces.

Dissolve both, and then mix the latter with the former drop by drop, stirring all the time. The bottle or vessel containing the mixed bromide solution is placed in a tin vessel with water to come up above the level of the solution, and is kept just under boiling point for about two hours for an ordinary rapid plate; for an extra-rapid one say three to four hours. Cool down to 110°, then add 150 grains of Coignet's gelatine, and when melted pour out into a dish to set in a cool place; then wash by any

of the methods most convenient, and add 100 grains more of Nelson's gelatine. Melt the emulsion and add ten drachms of alcohol; filter, and coat the plates.

Be careful that the emulsion be not heated to more than 100° after adding the last gelatine, or in all probability it will lose its setting properties considerably.

DRYING GELATINE PLATES.

By A. P. Laurie, B.Sc.

The ordinary method for drying gelatine plates is to put them in a drying-box as soon as they are set. These drying-boxes are constructed in various ways. The temperature must be slightly raised, and a current of air must be kept passing through them.

It takes at least twelve hours to dry gelatine plates in a drying-box. All this time the temperature should be kept up, and a current of air must be passing through the box. This is easily managed, where there is gas, by having a Bunsen burner burning in some situation where it will warm the drying-box, and also so arranged as to cause a current of air to pass through the box. This is done by means of an injector, the motive power being the current of hot air from the Bunsen burner. The box itself is usually a wooden one, made of a size suitable to the number of plates to be dried, and constructed so as to be perfectly light tight. It usually has a system of flues and air passages, more or less complicated. This method of drying gelatine plates is very satisfactory, though rather tedious, where gas can be got, but is not so easily managed in the country. The drying of plates is, besides, liable to some misfortunes. Occasionally a curious but ignorant friend opens the door and has a look at the plates. Sometimes the drying-box gets on fire, and, as the plates are often drying during the night when no one is about, this is rather disastrous.

Dust must be carefully guarded against. It is sufficient for this to cover the holes by which the air is admitted with muslin. The drying-box or room is, no doubt, the way in which commercial plate-makers will always dry their plates; but it is sometimes very convenient for the amateur emulsion maker to dry his plates as quickly as possible. Now, the water is held very tenaciously by the gelatine. This is shown by the time it takes to dry the plates in the box.

If, then, a plate is to be dried quickly, some other method must be used. Now, though gelatine holds water very tenaciously, the attraction of alcohol for water is much stronger. Accordingly, if we immerse a gelatine plate in spirits of wine after it is set it will be dried almost completely, and at the most will only want an hour or two in the drying-box. The objection to this process is that, after one or two plates have been dried in this way, the alcohol will not act on any more and must be thrown away. Now, the explanation of this is very simple. While the gelatine plates are losing in water the alcohol is gaining; consequently, when the percentage of water in the alcohol rises to a certain amount, the alcohol will no longer be able to draw the water out of the gelatine. If, then, we could remove the water from the alcohol which it has taken up we could use it again.

Carbonate of potash is very soluble in water and insoluble in alcohol. If some lumps of the dried carbonate be thrown into a mixture of alcohol and water the carbonate dissolves in the water, forming a heavy solution, which lies in a layer underneath the alcohol. In this way, then, the water is separated from the alcohol, forming a layer at the bottom. The alcohol and the aqueous solution will no more mix than will oil and water.

I propose to make use of this in drying gelatine plates. My method is as follows:—Have a bottle containing spirits of wine (and a second bottle containing carbonate of potash, which has been dried); pour some spirits of wine out of the first bottle into a dish, and use it to dry plates until it is exhausted. Then pour it into the second bottle, and take a fresh supply of spirits of wine from the first bottle. There should be sufficient spirits of wine in the first bottle to dry all the plates. The spirits of wine will, in this way, be all ultimately conveyed to the bottle containing the carbonate of potash. The water will soon be removed from it so as to bring the alcohol up to about the same strength as the spirits of wine—that is, about 80° (·848 alcohol). It can then be carefully poured back into the first bottle, care being taken not to let any of the solution lying at the bottom escape with it. There is no difficulty in doing this, though a little alcohol may be lost. Then pour the solution left in the bottom of the bottle into a pan or ladle, and heat it over the fire. It will quickly evaporate and form a hard, white cake. The cake must be broken up and put back in the bottle, which is now again ready for use.

This process could also be worked continuously, and so enable the operator to use less alcohol. I have devised an apparatus for doing this, and constructed a rough model which I found to work pretty well, removing the water from the alcohol. This must be further experimented on, however. A cylindrical tin vessel is closed in at the top by a tin funnel. It has also a tap soldered in at the bottom and another tap soldered in a little higher up—say about one-third of the height of the can. The orifice of the funnel is made very small, or, what is better, the funnel slopes in abruptly without the tube seen in most glass funnels, and has a piece of wire gauze over the hole. Into the top of the funnel fits a cylindrical vessel, open at the top and closed at the bottom with wire gauze. The funnel is filled with small lumps of potassium carbonate, and then the cylindrical vessel is fitted into the top. The alcohol, as soon as it has become charged with water and will not dry any more plates, is poured into the cylindrical vessel. It trickles through the wire gauze into the funnel, and is thus distributed over the carbonate of potash. It finds its way through the carbonate of potash, and ultimately a mixture of strong alcohol and carbonate solution drops through the funnel into the vessel below. There they immediately separate into two layers, and may be drawn off by their respective taps.

I made up this arrangement with a glass bottle, into the neck of which I fixed a glass funnel. The orifice of the funnel was contracted by putting into the bottom a small cone of tinfoil. Into the top of the funnel was fixed a small sieve. What would probably act as well as anything would be a French coffee-pot, with two taps soldered into the lower part.

The carbonate of potash is either moist when it is bought or soon becomes so. Before use it should always be dried in a ladle over the fire.

SPOTS IN GELATINE PLATES.

By John Jackson.

There are several kinds of spots in gelatine plates, differing in their nature and arising totally from different causes.

First. There are spots in the emulsion—small, round, dark specks, which make their appearance during development; in fact, by careful examination of the plates may be seen before development, by taking a plate into a strong light and looking along the surface of the film. In some batches of plates I have had them very plentiful. These, I believe, arise partly from insufficient filtration of the emulsion and partly from impurities in the water used in washing the emulsion. Perhaps the water may have become impregnated with lead from the pipes, or other foreign substances may have got into the water.

Second. Round spots of clear glass, often in clusters, which appear after fixing the negative. These have been found to arise from want of due care in the application of the developer, thereby causing air-bells to float on the surface of the sensitive film, and thus prevent the developer to act on these particular parts. Some plates are much more liable to this than others, the films of some kinds being so absorbent as to take any developer, while in other batches the film seems to repel the developer. The best method of avoiding these spots is to use a flat camel's-hair brush, and immediately after the application of the developer to sweep the plate lightly and quickly while the film is still hard. This plan is recommended by Mr. J. W. Swan, and, so far as my experience goes, I have found it to be "a perfect cure."

There is, however, another kind of spot which for some time gave me much annoyance, and it was a long time before I found out the real cause, but at the same time the remedy suggested itself to me. The cause was dust falling on the surface of the sensitive film while in the dark slide. This was more especially the case when I had to expose the plates after a long drive. For convenience it had been my custom to lay my camera case and slides horizontally inside the trap while travelling, the shaking on the road thereby causing specks of dust to fall from the slides on to the face of the plates. Now, however, I always endeavour to carry my slides containing sensitive plates in a perpendicular position, and thus reduce to a minimum the chance of those small particles of dust lodging on the plates. Of course after a long journey it is always advisable, if possible, to take the slides into a dark place, draw the shutters, and pass a flat, soft brush over the face of the films.

THE PRESERVATION OF GELATINE NEGATIVES.

By W. B. Doyle.

In these enlightened days, when photography makes such progressive strides, and is universally acknowledged to have established for itself

a high reputation and an important commercial position, it is essentially necessary that the most practically-efficient, sound, and perfect business management should be followed in the various branches of the art.

In consequence, it is only reasonable to infer—and it will be acknowledged that it is of the highest importance—that a simple and efficient means should be established of preserving negatives, so that they may be ready for use at a moment's notice in an uninjured and perfect state, and that prints may be expeditiously obtained from them when required. The adoption of a good and sound method is very desirable—in fact, is an imperative necessity; and any such method, to be a thorough one, must be based on reliable data deduced from the results of experimental research and accumulated experience.

It is well known and will be readily acknowledged that in practice, when the operator completes the negative, the first act of preservation is to varnish it, the object of varnishing being to protect the delicate collodion or gelatine film by a transparent covering possessing a nature sufficiently hard and repellent to guard the film of the negative from being easily damaged or injured by negligence or constant wear and tear, or the thousand-and-one accidents that a negative is heir to.

On the other hand, the varnish should be absolutely non-hygroscopic, so that it will be perfectly impervious to the variations of temperature due to atmospheric changes. If the varnish do not fulfil this last condition it renders the film of the negative liable to deteriorate whilst being kept, owing to the constituents of the varnish absorbing aqueous vapour, which causes unequal expansion and contraction to such an extent that the film splits and cracks, arising from the difference of the power of expansion of the negative and varnished films. This, unfortunately, too frequently happens, and many excellent negatives are lost in this way by these defects. Now, the varnish procurable in the photographic market at the present day, although possessing to a certain degree the first requirement of a certainty, does not absolutely fulfil the second condition, and it has, in consequence, suggested itself to me that there is a wide field of research open to gentlemen of an inventive genius who care to direct their attention to the obtaining of a superior varnish to the one now in general use; in fact, a varnish that would meet the requirements necessary for the preservation and care of negatives that are required to be kept for a considerable time for the purpose of being printed from.

Now, I think it will be unnecessary to continue the further consideration of the varnish used generally for collodion negatives, as the defects are a minimum when compared with those constantly experienced with the gelatine plate, except to observe that the room in which both classes of negatives are stored should be of uniform temperature, and, if practicable, a continuous current of dry air should circulate through it.

Strange as it may appear, a varnish suitable in every way for a collodion film has often been found to be most unsuitable for a gelatine one. This, no doubt, is due to the difference existing in the physical nature of the substances that are used to form the film, and has such a perceptible effect that the condition of the varnish when used is totally changed; and it will be conceded that experience has shown that the

gelatine-varnished film absorbes moisture more readily and receives silver stains more freely from using partially-dried silver paper than the collodion film does. Further: if the gelatine film has not been thoroughly washed for several hours in constantly-fresh changing water, well-defined crystals of hyposulphite will be found formed on the surface of the varnish.

Another serious defect is (if the room in which gelatine negatives are stored be not perfectly dry) that the moisture in the room will condense on the varnished surface of the negative, causing peculiar sunken markings and inequalities in the surface layer of the varnish; also, in very many cases, serious discolouration.

These defects are so marked that they render the negative absolutely useless, from the fact that prints cannot be obtained from them; and I am of late more thoroughly convinced of the seriousness of these defects from having experienced a sad illustration of the destruction of a considerable number of gelatine negatives through the evil effects of fire. The fire broke out in one of our large photographic establishments, and fortunately was extinguished with the slight damage to property of a large table, some photographic equipment which stood beneath it being destroyed. The adjoining room to the one in which the fire occurred was a negative store room, the negatives being in their grooves, in a well-made cupboard, with the folding doors closed. As will naturally be assumed, a great deal of water was used in extinguishing the fire, and consequently a great deal of heated vapour was evolved. This vapour had a very destructive effect on the gelatine negatives, whilst our "old friends," the collodion negatives (of which a great number were stored in the same room), were absolutely uninjured. When the gelatine negatives were examined after the fire, those that had been coated simply with plain collodion were found to be slightly discoloured but not seriously injured, whilst those that were varnished only were completely destroyed and rendered totally unfit for further use. Those that had been treated with a film of india-rubber were found perfectly intact and in a good state of preservation.

From this experience can be deduced *data* that will point a lesson for the most effective treatment of gelatine negatives, so as to keep them in a perfect state of preservation. The negatives that withstood the extreme moisture and heat caused by the fire point this lesson, as they were coated in the first instance with a "horny," plain collodion, which gave the gelatine film the nature and advantage possessed by the collodion film, and consequently permitted any negative varnish being used, with the same desirable result. After varnishing these negatives were printed from in the ordinary way; but on the completion of the printing before being stocked they were coated with a solution of *india-rubber* that had been dissolved in a menstruum of chloroform or benzole. This coating dries evenly and quickly after a few minutes. When dry the negatives are stocked.

The preserving of negatives, before being stocked, with a fine layer of india-rubber has proved to be the most effective preventive to the absorption of moisture and the evil effects that follow; whilst, on the other hand, when it is necessary to reprint from any of the negatives treated in this way, it is very simple and easy to rub off the india-rubber protection with the soft part of the hand, and the negative is found

in a perfect state of preservation, ready to print from. This simple remedy for the serious defect to which gelatine plates are so unfortunately liable it is hoped will be found of practicable value; and if it be the means of saving any valuable negative that without its protection otherwise would inevitably be destroyed it will have served the writer's earnest wishes.

THE SILVER NITRATE PRINTING BATH.

By W. Hanson.

From several articles that have appeared in recent numbers of The British Journal of Photography on the subject of this communication it is quite plain that practical workers are still as much interested in it as they were before the advent of the several types of later date, which were expected to rival, if not quite supersede, the still very popular silver print. This being so, no apology need be offered by anyone who has a single atom of real practical knowledge to impart, for it is sure to be acceptable.

All will agree that the chief thing to be aimed at in the mixing and subsequent management of the silver nitrate printing bath is the perfection of the prints to be produced, and that nothing tends more to the attainment of this aim than the continued purity of the albumenised paper after it is sensitised. Then, the question is—What condition of the printing bath most conduces to the preservation of the purity of the sensitised paper? It is known that an excess of an acid in the bath generally tends to make the paper keep, but there are exceptional samples to be met with which are not amenable to the acid treatment; besides, when an acid is added to the bath darkening of the solution is sure to take place very soon, and all the troubles of clearing and filtering must be gone through again and again, whatever albumenised paper be used.

It was made known many years ago that a few grains of silver carbonate kept in the printing bath prevent the solution from turning black by maintaining it in a neutral condition. To whom we are indebted for the knowledge of this simple fact has escaped my memory. I think it came from Dr. Trapp. However, a bath so kept neutral works to perfection, requiring no filtering or other doctoring, only strengthening from time to time; but, unfortunately, a neutral bath does not tend to the preservation of paper sensitised on it. This is its only drawback. Neutrality is good for the keeping of the bath, and acidity is good for the keeping of the paper. Now, is there any salt that would be good for both purposes? There is.

I have found, after many experiments, that a little silver citrate added to the printing bath causes paper to retain its purity several days, and the prints are even finer than when the same paper is prepared on a neutral bath. Mix the bath of the required strength—say forty or fifty grains—then add two drachms of silver carbonate and one drachm of citric acid. Shake well at intervals, as the reaction takes place slowly. Allow time—say all night—to settle, and then decant (never filter) the solution. These proportions are for five or six pints of bath.

A WET-PLATE KIT.

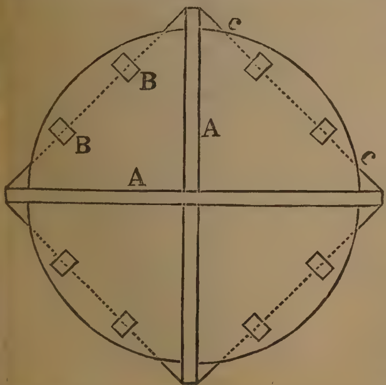
By Alfred Watkins.

For the benefit of those photographers who have not gone over to gelatine, even for outdoor use, I give the description of a tent and fittings I have found very convenient. It is the outcome of improvements made from time to time, and of course I, like all inventors, think my arrangement the best yet devised.

The tent is a pyramid or "Washington Wilson" one, folds up into a length of two feet eight inches, and with the camera legs slips into a canvas case seven inches in diameter. The chemicals, plate-boxes, and silver bath go into a square wicker basket fitted with compartments, and the camera, in a leather case, forms a third package.

For several years I used this kit, and found the packages of very convenient size for going under a railway carriage seat or in a pony trap. Three parcels are much more convenient to carry than one of great weight; but still, for any distance over half-a-mile, I found the weight too great for one person (I use $7\frac{1}{2} \times 5$ plates). The result was the devising of a light portable wheeling apparatus; and now it is as little exertion to take my wet-plate kit a couple of miles as it would be to carry a camera and stand and half-a-dozen dry plates.

The Tent.—This is a four-sided pyramid, covered with one thickness of black twill outside and one of yellow tammy inside. The height is four feet eight inches; the width of each side at the base three feet four inches, and at the top twenty inches. The diameter of the top, which is circular, is twenty inches. The legs are made of light strips of deal, each 2 ft. $6 \times \frac{3}{4} \times \frac{1}{2}$ inches, made to fold in the usual fashion of camera legs. The bottom of each leg is bluntly pointed but has no spike, as that would be apt to tear the fabric. The top of the tent to which the legs are fastened is the novel part. It is formed of an endless band of whipcord kept tightly stretched by means of two laths $\frac{3}{8} \times \frac{1}{2}$ inch and twenty-three inches long. The upper ends of the legs are strung on this cord, and kept sprung apart by means of knots on the cord.



The diagram represents the top of the tent as seen looking down on it. A A are the laths for stretching the cord; they come outside the covering. The tent top (that is, the fabric) is cut circular, as shown by the curved lines, and the sides sewn to it. The straight lines are the cords, and the dotted portion being that inside the tent. The cords pass through the sides (or, rather, the top edge) of the tent at C C. The top ends of the legs are shown at B B. They

are altogether inside the tent. Close to the bottom of each leg a curtain ring is sewn to the fabric. The leg slips through this, but is not otherwise fastened to the material, and so is at liberty to fold up—of course inwards. The top edge of the tent is strengthened by a leather band, through which the cord passes, and round the bottom edge outside is sewn carpet rings, in order to peg the tent to the ground in a wind. The covering is six inches longer than the legs, and laps on the ground to keep out light. The doorway must overlap quite two feet, and the window is formed of three thicknesses of yellow tammy (the black being cut away) about 12 × 10 inches. To pack up the tent:—The legs are pulled out of the rings at the bottom, and then folded up. The laths are pulled out and the top collapses. The fabric is then rolled up round the legs, and the whole, with the sticks and camera stand (folding) slipped into a canvas case. The manipulations are effected while seated on one of the plate-boxes.

The Chemical Basket.—A square wicker basket, fourteen and a-half inches square and ten inches high, is divided into compartments, each space being lined with felt. It contains water-tight bath, draining-box for wet negatives, plate-box with twelve albumenised plates, a sixteen-ounce square bottle with iron developer, a bottle for water, two eight-ounce square bottles with collodion—one with silver solution for intensifying (the cork is kept sound by being saturated when hot with bees'-wax), another with iron intensifying solution, some white blotting-paper, and the tripod top. I do not fix in the tent, but merely wash off the developer.

The fastening I use for the water-tight bath is, I think, entirely novel. I had been much bothered with the unsatisfactory iron clamps, and, having read in one of the year-books a recommendation to use a strap of hoop iron attached to the clamp passing round the bottom of the bath case, I tried this; but instead of iron I used a leather strap, when, to my surprise, I found that if the bottom of the leather strap be slipped along the bottom of the bath case the bath top was held on perfectly tight without any need of a screw. Two straps are used slipped on each edge of the bath case. The bottom ends of the straps are pushed towards each other, while the top ends are kept wide apart, thus wedging the top (I use a glass one accurately ground) on quite securely. I have used this device for two years and never had a leakage or any trouble with it, while it is put on and removed much quicker than in the old way.

Wheeling Apparatus.—This contrivance is simplicity itself and perfectly effective. Two deal rods, one and a-half inch by one inch and five feet long, are joined at one end by a hinge, the pin of which is knocked out and a movable one substituted. The other ends of the rods are rounded to form handles, and kept apart by a slight stretcher three-quarters of an inch by half an inch and sixteen inches long and one foot five inches from the handles. This strip is fastened at one end by a thumb-screw and at the other by a single wood screw, so that the triangle formed by it and the rods is quickly folded up. Fourteen inches from the hinge iron plates, two and a-half inches by two and a-half inches by an eighth of an inch, are screwed to the inner edges of the sides and project below them. These plates carry a short iron axle, the two ends of which are screwed into their lower edges. A

rubber-tyred suspension wheel twenty-two inches in diameter (the hind wheel of a bicycle bought second-hand) revolves on this, and the "wheelbarrow" is complete. The basket is strapped under the sides as near to the wheel as possible, and it takes the place of legs. The straps pass through leather loops on the sides to prevent the basket slipping on to the wheel. To complete the load, the tent (in canvas case) and the camera case are fastened on the top of the basket by means of straps.

Winter Photography.—I have several times used the tent during the most severe frost, when the developer and even the bath were full of ice needles. The method adopted was to keep one of the cheap flat spirit burners alight on the ground inside the tent, with a pint saucepan of water heating over it; the bath and developer were warmed by means of the hot water, and the temperature of the tent raised. If the compartments in the basket be well lined with felt and kept in a warm room during the night the chemicals would be at a normal temperature when used in the morning.

ON THE APPLICATION OF CERTAIN WELL-KNOWN PHOTOGRAPHIC RESOURCES TO THE GELATINO-BROMIDE PROCESS.

By GEO. KEMP, M.D. *(Cantab.)*

A PROMINENT feature in the literature of photography during the last year is the almost exclusive attention to the fascinating results of the gelatine process; and without detracting in the slightest degree from its pre-eminent utility as a rapid process, we are disposed to ask whether other photographic resources have not been kept too much in the background, and the mere property of rapidity has not assumed an importance far in excess of its general utility?

Of course it must be conceded that for portraiture, moving objects, and especially in its adaptation to astronomical research, the process stands unrivalled; but for the representation of machinery, fortifications, and other objects of a similar nature, in which rapidity is of less importance than absolute certainty of results, many of the older processes will ever retain their value.

Take, for instance, the primitive calotype. Years past, when the collodion process was just beginning to make its way, the Government spent vast sums in providing a certain harbour of refuge, which developed itself into a hitherto useless fortification. As usual the responsible contractors made use of divisional labour, and underlet portions of the work to sub-contractors, and a great amount of supervision on the part of the Government became necessary, with occasional visits of special commissioners at great expense to the country. One of the clerks appointed by the Government was an adept in the Talbotype process, and from time to time furnished the Admiralty with prints of the works progressively, and so placed the Commissioners in possession of facts which not only lessened their labours but enabled them at once to point out defalcations and breaches of contract which would otherwise have passed undetected.

Nor must it be forgotten that most of the pioneers of practical photography gained their experience by the use of this process, and acquired

more skill in manipulation and thorough insight into the chemical principles involved than many who, at a future period, entered at once upon the collodion process, and employed it in a mere empirical manner as a new branch of industry.

The object, however, of these hints is to point out a few aids to the gelatine and other colloid processes by the application of resources derived from older methods; and—

1. By means of one portion of the calotype process we are able to introduce iodide of silver into the colloid solution in a state of most intimate division. It is well known that the key to this process is the formation of a double salt of potassium and silver iodide held in solution by a very large excess of iodide of potassium. On diluting the concentrated solution with water an extremely-fine precipitate of iodide of silver is obtained, which, after removing every trace of iodide of potassium by repeated washing, may be added to the gelatine or collodion emulsion. In the latter case, however, the last washings should be made with methylated spirits and ultimately with alcohol.

2. Those who have practised the turpentine-waxed process must have observed that only a portion of the wax is dissolved in the mixture of turpentine and castor oil. When the residue has been deprived of the turpentine by heat it requires a far higher temperature to melt it than when combined with the soluble portion, and in this condition may be applied to the negative gelatine plate as a varnish. It is readily absorbed by the film and needs no solvent; heat alone is employed, and the varnish drained off.

3. A very convenient means of forming the bromide emulsion will be found in the use of gum tragacanth as a preliminary step. This gum we know absorbs water, but does not form mucilage until its molecular condition is changed by boiling in water. In a very dilute solution of this mucilage the bromide is dissolved, and an aqueous solution of the necessary amount of nitrate of silver is then added gradually, with motion. As the mucilage remains fluid the formation of bromide of silver proceeds uniformly and yields a very smooth emulsion, the sensitiveness increasing *pari passu* with the formation of bromide of silver. By testing, from time to time, by exposure to light, and the application of a developer the *maximum* of sensitiveness is arrived at. It is now only necessary to add the desirable quantity of gelatine, dissolve by heat, and proceed as usual.

4. In a previous issue of the ALMANAC the writer drew attention to the action of nitrate of uranium on gelatine. It was his good fortune recently to obtain from a provincial manufacturer a sample of the most execrable gelatine plates he ever had the misery to operate upon. In addition to other faults, though they were very rapid and took the image in the camera to perfection, they frilled horribly, and no application of ice-cold water, saturated solution of sulphate of magnesia, alum, or coating (according to Captain Abney's suggestion) with collodion remedied the evil in the slightest degree. As a last resource the edges of the plate for one-eighth of an inch were painted over with a weak solution of nitrate of uranium—ten grains to the ounce of water. The frilling was perfectly cured, and, although from other faults the plates were useless, the writer has adopted this artifice ever since with uniform success.

Many other instances may be adduced, but the foregoing are sufficient to show how satisfactorily many of the resources of older methods may be brought to bear on the now well-established "gelatine process."

A TRANSPARENT PAPER FOR BACKING NEGATIVES.

By William England.

It is ofttimes necessary to place at the back of the negative a piece of thin paper to make cloud effects or to render more opaque some parts which print through too much, so a suitable paper is necessary for that purpose, and the best I have found is a thin French post. This is made transparent by a mixture composed of equal parts of castor oil, alcohol, and ether, applied with a plug of cotton. It is almost as transparent as ground glass, and answers admirably for the purpose.

Should the negative exhibit too great a contrast the paper, before being so treated, may be laid on the back of the negative by means of thin gum water, and, after drying, the parts requiring to be made more transparent—such as distant mountains or water—are brushed over with the oil mixture; and, should any parts be very opaque, the paper may be cut away in a jagged form, so as to prevent a line showing when printing. Dark clouds may be put over the sky by using a small brush dipped in the oil, and cloud forms made on the paper; also light clouds, by a judicious use of indian ink.

I have tried many methods of making the paper transparent, but all have some defects. Some, like paraffine, evaporate; others turn the paper yellow or are difficult to apply, such as wax. But the castor oil mixture answers admirably.

CINDERELLA.

By W. H. Davies.

From the varied developments of photography much may not only be learned to advantage, but much also to be avoided. The commercial element seems to be in the ascendant at present, and so far it does good work not only in its sphere but also in those other spheres in which it has made itself master. In my early days we—that is, I and many others of the amateur type—were under the delusion that every little mite we could give to the help of the building of our great art-science was at least one solid stone towards the superstructure at which we aimed—that of developing a new art, and getting or making it to take a place alongside the other representative arts.

All arts are representative. The painter may represent either what he sees as the camera does, or he may soar into the higher regions of his imagination and produce what never was, and some ill-natured persons say what never could be. So with the sculptor, the engraver, the etcher. Photographic art is also, and it may be in a higher degree, representative, but not therefore slavishly imitative. It is capable of much higher efforts, and it is but while under the spell of those who claim the exclusive name of "artists." I said "spell"—should I not have said "BAN?"—because, as it is, how many of our painter artists do take advantage of the help, the skilled help, which the

camera can give and *does*, and at the same time abuse its professors? From the highest or most advanced of those who appropriate to themselves the title "artist" to the lowest, all are dependent in a greater or lesser degree upon the youthful daughter of the art they affect.

It seems very much like making a hole in trade secrets, but may we not be better for being at once face to face with the absolute. Everyone knows that all painters who trust (nowadays) to their eyes and hands, and let me add brain, are none the less thankful for the help the so-called poor Cinderella, "Photography," has been to the bigger and taller sisters who could see nothing in her. However, she is like Ginx's Baby—she is there and will not be overlooked; and if she be, there ensues a squabble among those who will insist on being the only representatives of the divine, the humanising, the great art of representation—be that in colour, transmuting dross into brilliant life; or from the rough, unhewn block, fit only, it may be, for the foundation of a palace, creating a fancy that the palace is hardly worth being frame or shrine for. Thus t is that it is not the mere labour—not the time said to be wasted in bringing out the effect or effects—but the long previous training of the brain to give the hand and eye power over what is seen, transmute that into brain power; and then, no matter what is the medium, one may be more and one may be less capable of expressing the inner sight, but all strive to do as best they can to give out to those who have it not the universal love of, and desire for, art—art in some form, whether it may assume the commonest form of fictile ware, the most perfect photograph, or the finest efforts of our sculptors' or painters' art.

Let me, then, plead for some favour for poor Cinderella.

CARBON PRINTING: A FEW PRACTICAL NOTES.

By George F. Williams.

After a cessation of a few years I have again resumed printing in carbon, from which process I have derived considerable pleasure, the attraction of a very pretty process combined with the reputed stability of the results being, to my mind, sufficient to warrant the application of one's energies to overcome some of those difficulties which are inherent in the process, and which render it so dissimilar to silver printing.

I do all my own printing, for reasons that need not be entered upon here, and it has frequently been a source of anxious thought "how to do it." As an amateur my time and opportunities for printing are short and irregular. I have long felt that excellent results by no means follow with any certainty by the use of the ready-sensitised silver paper. It is very many years since I sensitised my own albumenised paper, and I do not think I can bring myself to do it again. At the same time I admit that I never got such brilliant, clean, harmonious prints as when I sensitised my own paper. I have got fair results with ready-sensitised paper in this sense—that out of a dozen prints I could perhaps select *one* fit for exhibition purposes; but that is a very small proportion, and it means a heavy cost for time and materials to obtain that one.

With carbon, when in full swing, I have found the percentage of good prints higher, but it takes some practice and failures to arrive at that full swing; and that is just where amateurs stick fast. They will not give the time and attention necessary to overcome the elementary difficulties; they expect to succeed at once. Silver printing is so easy; and so they keep on using ready-sensitised paper. I admit carbon printing is probably much more difficult for an amateur than silver printing. The tissue takes longer to dry than even albumenised paper; it changes every hour, becoming more and more insoluble. The exposure must vary with that change of solubility; and then there is the continuating action to be taken into account, and in this respect alone the difference between silver printing and carbon printing is enormous. If any amateur thinks he can print a batch of tissue today and develope them a week after he will be somewhat mistaken.

So much has been written on the subject of carbon printing by very able men, that anything I could say beyond a few hints would be out of place here. The chief advantage to be derived from the employment of carbon tissue is the admitted permanence of the resulting prints, insomuch as that they are almost entirely free from those deleterious compounds of doubtful nature brought about within the body of the paper of silver prints by the use of hyposulphite of soda. Beyond this, my experience is that greater depth of detail is obtainable by carbon than by silver; and there is a more harmonious relation between lights and shades, especially if the prints are developed upon collodionised glass. My *modus operandi* is, briefly, as follows:—

I prefer a tissue for landscapes such as the warm black, although a great difference will be found in the degree of warmth or blackness in the tissues of various makers. For portraits the special portrait purple is a very nice tissue. I work for landscapes the size of $7\frac{1}{2} \times 5$, and it is pleasant to see how nicely the bands of tissue cut up into strips five inches wide, and each such strip makes four $7\frac{1}{2} \times 5$. I use four lumps of lead wrapped in clean paper to flatten the bands of tissue out whilst I cut it up with a straight-edge and sharp knife. The curling-up propensity of tissue is a drawback only counterbalanced by the compactness and portability of the bands or rolls, otherwise I should prefer to buy it in flat sheets. If the makers would supply tissue cut up of all the current photographic sizes it would be a great convenience.

The dishes I employ are made of sheet zinc, than which I can find no better material. They do not rust, as tin dishes do; they do not oxidise nor crack, nor suffer if they get an unlucky thump. They will stand scalding water, and may be placed over a spirit lamp or gas stove, or otherwise roughly treated, if water cover the bottom. I have simmered over-printed tissue proofs in these zinc dishes and made passable pictures of them.

For landscape work, and with the ordinary run of gelatine negatives, I find that at three per cent. the sensitising bath gives the best results; for portraiture, where great softness and delicacy is required, four per cent., or even five per cent., may be used. Of course, the bath must be made faintly alkaline; the degree seems to be of little moment. I pour the bath solution into an ordinary tin funnel, the spout of which is plugged with a piece of clean sponge, cut into such a form as will ensure the solution passing through

at least an inch of sponge. The bichromate solution will pass through pretty rapidly, and when all is filtered into one of the zinc dishes aforesaid I commence by immersing my pieces of tissue one at a time, keeping each piece overhead in solution until it uncurls, rubbing off all air-bubbles. When it shows signs of curling in the opposite way I lift it out by one corner and drop it, black side down, on to a piece of plate glass placed at the left of the sensitising dish at an angle sloping into the dish, and the surface of which glass has been wetted by the squeegee being dipped into the bath. I lightly squeegee the excess of bath off the back of the tissue, driving the liquid into the dish, and then lift up the tissue by one corner and place it, black side upwards, on blotting-paper spread out on a shelf or table in a room free from dust and daylight, and in which a fire has just died out.

The time of immersion, as also the time occupied in drying, have both considerable influence upon the tissue in its ultimate use; and much has been written on this head in the photographic periodicals, to which I would refer for ampler details than are possible here. In my own practice I find that tissue which dries in about eight to nine hours gives me the best results. It is then sensitive enough, soluble enough, and adhesive enough for all purposes. The amateur commencing carbon printing will probably produce a batch of insoluble tissue "first go off," but that difficulty will soon be overcome.

Supposing the tissue to be sensitised at night, it should be dry and ready for use next morning. By cutting the tissue up into pieces about a sixteenth of an inch less than the size of the negative, and by using those printing-frames the size of the negative with a rebate of an eighth of an inch or thereabouts, the necessity of a safe-edge round the negative may be disregarded. Gelatine plates exposed in dry-plate dark slides have generally a margin of one-eighth of an inch unexposed; but this is seldom clean glass. It is generally slightly stained by the developer and by halation, and this alone constitutes a safe-edge. But should a safe-edge become a necessity by reason of partially insoluble tissue, then the best and easiest way to do it is to take some negative varnish and stain it red with dye. Tie a small camel's-hair brush to a wire, dip this into the red varnish, and run it round the edge of the negative. It will dry quickly and is efficient. I have not found it essential to varnish my gelatine negatives for use in carbon printing. Of course the tissue must be dry, and care be taken that no moisture gets in between the negative and the tissue. As yet I have had no mishap from this cause, but a coat of plain collodion would make the negative safe enough to prevent adhesion of tissue.

No doubt it is in the exposure that amateur carbon printers go wrong. A word of experience may be useful. I find Warnerke's sensitometer scale is a very useful actinometer for this purpose. With tissue sensitised in a three-per-cent. bath and dried, and used within twelve hours, I find, with the ordinary run of gelatine landscape negatives, a piece of ready-sensitised paper placed under Warnerke's sensitometer will show faintly from No. 12 to No. 15 by the time the carbon tissue is printed sufficiently, if it be developed at once. Nothing but experience can be of any use in this branch of the process. One or two trials of a batch of sensitised tissue will soon give the clue to the exposure requisite. The plan of printing a silver print side

by side with the carbon tissue may answer in some cases; but in my hands, by the time the silver print would be "done," the carbon would be vastly *over-done.*

Of all the methods of developing carbon prints I prefer collodionised opal glass. I make my own plain collodion—four grains of an ordinary pyroxyline per ounce of solvents. If the opal glass be quite clean I pounce on it some powdered French chalk, smear it over with a piece of flannel, and then dust it off with a broad, soft brush. Coat with collodion, allow to set, and then immerse in cold water. The operation of squeegeeing the exposed tissue on to the collodionised opal glass and subsequent development is so well known that I need give no details here. I would merely remark that, as a rule, amateurs do not develope their prints sufficiently. They are afraid of the tissue washing up or reticulating or dissolving away, and a dozen other troubles; but if these arise they are due to an improper condition of the tissue. If the tissue be in good order it is astonishing what it will stand. I use a soft camel's-hair brush when developing. This enables me to clear up dark places, give local light, and gain any amount of contrast I desire. I now always use French chalk—not wax.

I have recently been experimenting upon some rather insoluble and over-exposed tissues, which not even boiling water would develope. I hit upon the idea of trying dilute nitric acid—one ounce of acid to four or five ounces of water. Of course this attacks the gelatine and partially destroys it, so that hot water applied after a few minutes' soaking of the print in dilute acid will bring away the hitherto insoluble matter in abundance. The objections to this procedure are—that the acid attacks the colouring matter of the tissue, and the resulting prints are, therefore, grey or black. The red or purple tone of the tissue appears to be very fugitive in presence of acids, whereas the black itself seems proof against it. The other objections are a tendency to extreme contrasts, as the half-tones get dissolved away, and there is also a risk run of injuring the collodion film next the glass and upon which the tissue rests, so that the prints do not leave the support when the final transfer should take place. For transparencies or lantern slides which are left on the glass this is of no importance; in fact, the use of acid in such cases may have a beneficial effect in clearing away the haze or veil which sometimes comes by reason of insolubility of tissue, and also to heighten contrasts which may be desirable in lantern slides. I have no doubt the judicious use of acid as here mentioned may prove of great value.

The development of carbon tissue on collodionised opal glass offers such a very wide field for experiment, with pleasure and the profit of experience, that I must leave the matter for those who care to do so to follow it up. It is really a most interesting subject well worth pursuing, especially in the dull season, when the exposed tissue can be developed at night.

The development being completed and all ready for the final transfer, the only question that will arise will be —"Gloss or no gloss?" This subject has met with a great deal of discussion, and whilst disliking anything in the way of "get up" or French polish, I cannot help leaning to the method of mounting carbon prints *with the gloss.* To my mind there is a depth and transparency in the shadows and half-tones

secured by that method which is almost entirely lost in silver prints. Of late the fashion of mounting silver prints in optical contact with glass has come very prominently forward. I maintain that carbon prints mounted with the gloss are equally as brilliant and artistic.

Dr. van Monckhoven has introduced a double transfer paper, called "enamelled." I find this a very good article. It is claimed that it will transfer from waxed glass *without* a film of collodion and give gloss. The only precaution I find necessary is to soften it in merely *tepid* water; for if it be put into hot water the colloid surface immediately dissolves off. Before the final transfer, or in the case of transparencies and lantern slides, the developed prints may be toned with the utmost ease. I refer my readers to an article in THE BRITISH JOURNAL OF PHOTOGRAPHY, page 104, March 4, 1881, by Mr. H. Y. E. Cotesworth, on *Toning Carbon Prints*, which gives the whole of the secret.

In the foregoing I have only alluded to development on opal glass. The use of opal glass is simply to judge accurately of the process of development. To the flexible support I never took "kindly." If gloss is not liked, the glossy prints can be readily reduced to a similar appearance to albumenised paper by damping or by mounting after stripping from the glass; or the opal glass may be very finely ground, and the prints then strip dull.

It is a matter of surprise what little is seen of amateur work in carbon, and that little of bad quality. It would give me great pleasure to think that my "hints" had in any way increased the quantity and improved the quality. I earnestly invite amateurs to try. There are many workers who are willing to help them, and the columns of THE BRITISH JOURNAL OF PHOTOGRAPHY are always open with that view.

VERSATILITY.

By GEORGE MASON.

IN the theatrical profession a "utility man" is one who is supposed to perform any little part, from the leading on of the infuriated mob to dressing up for the first robber, who delights the audience more with his pantomime than his poetry. However, when the aspiring genius grows beyond utility, he generally settles down to one line of business, such as "old men," "juveniles," "heavy," "lead," or the like—a sort of "caste" chosen and retained throughout his professional career. In India the case is different, for there the profession comes with the birth; hence the water carrier but carries water for you as the business of his life—"only that and nothing more."

Now, in photography this one line of business has been adopted to a considerable extent—so much so that it acts as a detriment both to the employers and employed. The youth of our profession no sooner gets beyond the cleaning of glass and the general slop work of the studio than he betakes himself to one groove, and works in that one only. You would be perfectly amazed at the barrenness of knowledge displayed by five out of every six professing photographers when applying for situations. They know the practical business of the groove in which they have been working, and that is all.

A printer can print and an operator can take negatives, but the printer will tell you that he knows nothing about negative taking; and the negative man will tell you that he cannot undertake the printing part of the business. In fact, it has been cut into such fine lines lately that we *do not start back* with astonishment when a young fellow quietly informs us that he is only up in dark-room work. Now, for one special hand wanted twelve versatile hands could be engaged, but they are very difficult to get. In the larger studios over the country special men for each department are required, but for every such situation vacant there are hundreds of others calling for men of a more general knowledge.

Take, for instance, a small photographer in the country who does a thriving little trade. He wants an operator and can pay him fair wages, but this assistant must be able to retouch as well as take a good negative. Not one in twenty of the applicants will be found to meet the requirements in such a case. Then, when retouching is the specialty, with a slight knowledge of negative-taking, the same difficulty arises. Say, again, that you want a carbon printer. The chances are that, when testing the qualifications of the applicant, you will discover that he has been accustomed to "double transfer" only, and that he knows little or nothing about "single transfer" work; or, it might be, that he has been engaged on "single transfer" only, and that he has still to learn how to produce a "double transfer" picture; and should you venture to add "silver printing" as another necessary part of his trade knowledge, why—he collapses!

This state of things need not be, for I am quite convinced that with a little forethought, application, and energy our rising photographer could be a much more versatile class of man, and if he would but give the art-science the time and the study it would repay him in hard cash all through his life.

A good "all-round" man is difficult to get; still, he is to be met with sometimes. One reason why so seldom is that once secured he is never allowed to go if a fair return for the knowledge that he possesses will keep him—a knowledge which, when once acquired, is such an easy thing to carry about with him. It is not to be supposed that a man can be equally good in all the varied branches of a profession like ours. At the same time it is not necessary to be so practically ignorant of the branches that are daily worked in the same premises, although in the routine of duty he has not the direct handling of them.

In making these few notes, more especially for the benefit of you, the younger members of our profession, I would draw your attention to the fact that versatility is sure to make better men of you; and this, combined with the fact that it pays well, makes it the more to be desired.

Now, suppose your great aim (for everyone has some point more than another to which he wishes to attain) should be to become a first-class operator, and that the negatives you wished to produce should be second to none that you had ever seen. Your ambition would be most laudable; but still you surely could find a little time to try your hand at the working up of a negative, till by repeated attempts work could be produced that would be passing fair. Surely a little time, also, could be given to printing, which, by the way, is a branch of our trade that in

many studios does not get the attention its importance demands. Acquire the knowledge of what is really a good print, and go carefully through all the manipulations in its production, noting well everything that tends to mar it. A little time should be found to sensitise a piece of carbon tissue, and experiments should be made in this field of labour also, so that you would really know something about it if it should turn up to be wanted in any place where you might happen to be engaged. Now I have no doubt that hundreds are ready to swear that they know all this—and more. Doubtless, that is so. It is not for such that these remarks are penned, but for the less fortunate brethren

"Who don't know everythin' down in Judee."

To them I would say—Never rest till you can make a good negative, and till your negatives are, as a rule, good.

Never rest till you can retouch as well at least as to clear away defects and make your work as near perfection as possible.

Never rest till you can produce good prints from your negatives.

Never rest till you can mount, spot, and roll your prints yourself.

Never rest till you can produce a print both in single and double transfer.

Never rest till your knowledge and practice are such that you can hold your own in most circumstances.

Never rest until you have attained all these, for of such materials are employers made.

EXPERIMENTS WITH THE HALOIDS OF SILVER.

By Cosmo I. Burton.

The experiments I am about to describe are, as I am well aware, not new to the world, but they are very interesting. I think it likely that some of the readers of the Almanac may never have had their attention called to this subject before, and this is why I venture to bring it under their notice now.

The experiments were chiefly on the action of light on chloride, bromide, and iodide of silver under various circumstances. To begin with the chloride: moist silver chloride, as everybody knows, turns black or, rather, dark grey on exposure to light. Mr. M. Carey Lea makes the following remarks on this action:—"After five days' action of strong sun on moist silver chloride, exposed in a thin layer and frequently stirred about, *one per cent.* of the chloride is acted on." This statement is a little difficult to believe; but we must think twice before doubting so high an authority as Mr. Carey Lea. The product is not acted on by nitric acid, so that it does not contain metallic silver (indeed, chloride of silver readily darkens in presence of nitric acid); but, as it is readily whitened by *aqua regia*, it is probable that the darkening is due to the formation of sub-chloride or oxychloride. Addition of nitric or hydrochloric acid to the chloride of silver makes very little difference either to its sensitiveness or the appearance of the product.

The presence of nitrate of silver makes the chloride turn more quickly, and the product is of a darker colour. Chlorine water very

greatly retards the action, but after long exposure the chloride becomes of a light brown colour.

Iodide of silver, when quite pure, is not affected by light; but in the presence of the smallest trace of silver nitrate it turns to a dirty, greenish-black. Iodide of potassium prevents the action of light, or restores the yellow colour to already-darkened iodide. Nitric acid prevents the action of light on either bromide or iodide of silver. This may be explained by saying that the compounds produced by the action of light on the bromide and iodide are less stable than that produced similarly from the chloride.

The addition of bromine to silver bromide, or of iodine to silver iodide, completely prevents the action of light on these substances. The addition of various colouring matters to the haloids of silver causes great alteration in their sensitiveness to light of different colours; but this subject is too extensive to enter upon here.

Dr. Vogel, who has made many investigations of this subject, has given the following as a brief outline of his results:—1. Chloride, bromide, and iodide of silver are sensitive not only to the more refrangible (violet end), but also, though in a far inferior degree, to the less refrangible (red end), of the rays of the spectrum. 2. The sensitiveness of silver haloid salts to light of different colours depends not only on their optical-absorption capacity for these rays, but likewise on the optical-absorption capacity of admixed substances. 3. Coloured bodies, which assist the photographic reduction process and at the same time absorb certain spectral colours, give rise, when properly applied, to a great increase in the sensitiveness of silver salts to the absorbed rays. In this way the sensitiveness of silver salts to the red, yellow, and green rays may be greatly heightened. 4. Mixtures of different colouring matters produce an effect equal to the sum of the effect of their constituents. 5. Certain colourless bodies—as silver nitrate and morphine, which promote photographic reduction—exert a considerable modifying influence on the colour sensitiveness of silver salts.

AN EXPERIENCE.

By CH. AUDRA (Paris).

A FEW weeks ago—in the month of September—I had joined my family in the country in that charming corner of Normandy known under the name of Villers, without forgetting, as a matter of course, my camera and a few dozen dry plates prepared by myself during the preceding spring. An experience happened to me which I wish to relate.

The house which I occupied contained on the ground floor a dining-room lighted by a single but large window, looking on to a small garden. One day, the weather being dull and without sun, judging that I should not be able to obtain satisfactory negatives out of doors, I wished nevertheless to assure myself of the quality of my plates, and I set up my apparatus in front of the window, which plays an important part in my story. The window was open and surrounded by climbing plants, but presented a wide, dark aperture by reason of the small amount of light which penetrated to the interior, and it required

some animated countenance to light up the sombre cave. I placed there my son—a lad of twelve years—and after the sacred words, "Keep still," I exposed for about a second.

However, I was not satisfied with the illumination of my model. I resolved, then, to expose a second plate, and I changed the position of the little patient, who lent himself the more willingly in order that he might be the sooner free to return to his play. I exposed a second time, and went in anxious to see on development what results my precious plates would give.

Commencing with the first plate, I felt only joy on seeing appear, with judicious slowness, the graceful outlines of the window and its bordering of foliage. But gradually terror seized me! What has happened? In the dark background, lying white in the picture, are profiled two *silhouettes* gaining strength gradually—*two* sons, perfectly clear, perfectly distinct, regarding one another closely, almost menacingly—two sons of the same height, the same general appearance—*mine*, who had but one! I experienced a moment of dizziness, for one does not thus see one's family increase in a few seconds without a certain emotion!

It was, however, true! I had two sons—veritable twins—upon my negative. They were both charming, you may believe me, and wonderfully thriving! What to do next? To develope the second plate and see if I should not have three? It was quite useless; for, need I say, it remained on the developer as spotless as the virgin snow!

There is my story. I do not know if it be new to all, but it amused me. Not having moved my camera between the two exposures, and having omitted to change the plate, the window and its frame had been exposed twice; but the two exposures, being exactly superposed, gave but one image, while on the black background of the opening of the window no impression had been produced either by the first or second exposure, and the lad was profiled successively against the background in the different positions—*not superposed*—producing the effect of two separate yet identical models.

I have since frequently repeated this experiment, and I have thus produced, with the greatest ease in the world, three and even four portraits of the same individual in the most diversified positions on the same negative. I know well that a similar result has been produced long since with a special shutter fitted in front of the plate, which accident alone, moreover, taught me, requires no special apparatus, and is within the reach of the most humble amateur, furnishing him with the opportunity of especially perplexing those people who fancy they know everything and can explain everything.

Excuse my plain story, which has no other pretention than to afford a little amusement to your readers, amongst whom I am one of the most assiduous.

COMPOSITE NEGATIVES.

By Alexander Cowan.

The following has been found a simple way of uniting in one negative various effects which are generally only obtained by double printing:—

First take a few negatives of any suitable backgrounds, and from these negatives make positives on gelatine plates by contact printing

on the same sized plates that are used in the camera. Now place in the camera, as close to the front of the slide as possible, an oval mask of the size required, and put into the slide a gelatine plate, carefully noting that it fits closely *into the lower left-hand corner.* Then proceed to take a negative in the ordinary way.

This plate will have, of course, an oval picture with clear margin. When dry place in contact face to face with one of the transparent positives already made, being careful to register them by the same *left-hand corner;* then to the back of the positive fasten with gum a disc of opaque paper cut from the same mask used in the camera, being careful to register the same in the centre of the oval picture. Next take a printing-frame a little larger than the plates used, and fasten into it a clear *patent* plate glass, and on to this glass fasten a cardboard mask of the thickness of *two* negative plates and about half-an-inch larger each way than the size of the plates used. This is to form a rebate in which to correctly register the plates by the same corners that were used in the camera. Also, to the outside of the glass, fix a similar mask of convenient size to form a rebate to hold a phosphorescent tablet, such as is used with Warnerke's sensitometer, which is to act as the source of light. Now proceed to make a negative by placing between the subject and the lens any vignetting arrangement preferred, and focussing so that the picture balances well in the oval opening, not forgetting to see that the plate is placed in the *left-hand corner of the slide.* After exposure remove to the dark room, and place the plate in contact with one of the positives having the oval disc attached, seeing that both exactly register in the left corner of the printing-frame as arranged. Now illuminate a phosphorescent tablet with a small piece of magnesium wire, and place in the rebate of the frame ; expose for the number of seconds required, according to the density of the positive (four or five seconds is generally enough), and proceed to develope in the ordinary way.

The resulting negative should have the subject vignetted into a softly-defined oval, on a background of whatever character desired. Of course, in practice, if these pictures are required frequently it will be better to impress a number of plates with the backgrounds first and keep them in readiness.

The phosphorescent tablet is recommended in preference to any other light, because, being placed so near the plate and having a larger surface than the oval mask, the rays of light run under in all directions and tend to soften the outline and obliterate any slight error in the registration. Gas light at a distance can be used, but gives a much harder outline, and requires to be very carefully adjusted to the centre of the plate.

THE HOLIDAY TRIP FOR 1881.

By Matthew Whiting.

It is rather difficult in the year 1881 to find fresh fields for dry-plate views that have not been represented many times previously ; but, by visiting the varied scenery along the Caledonian Canal, and taking some of the glens towards the western coast, grand views may be obtained that few people, except artists of the brush, are much acquainted with.

Having previously stopped at Drumnadrochet without allowing sufficient time to do justice to that part of the country, I determined to make the experience gained in former years available. The new trip accordingly planned was from Edinburgh to Loch Earnhead, with excursions to St. Fillans, Tyndrum, Loch Tulla, &c., and Oban, with excursions to the Pass of Melfort, Fordon, Loch Awe, Pass of Brander, Dunolly, and Dunstaffnage Castles, &c.

At Oban there is good work for a drop shutter, so as to obtain sea views with boats, clouds, and hills in the distance. Fort William or Banavie must be stopped at for one night. The former proved somewhat dull, and another time I would prefer the latter.

Glen Garry, a little further on, leading to Loch Duich, is very wild and away from the haunts of men. Glen Morriston also is very beautiful, with silver beech and heather. The salmon ladder, on the Morriston river, makes a good subject for the camera; besides which there is a great variety of foliage all up the glen. My next place was Drumnadrochet, in Glen Urquhart, where I stayed a week at a most comfortable hotel. The Castle, Falls of Dhivach, and numerous walks filled up the time well.

I now left the great waterway of traffic and hired a carriage, which took me twelve miles to Glen Affaric hotel, in the midst of some of the most beautiful scenery in all Scotland. Here there were three artists staying for a month, each day bringing home some series of sketches or water-colour drawings to place on the mantel shelf. These were intended to serve for the production of larger works of art afterwards, and may possibly adorn the line of some future Academy exhibitions.

Glen Cannich, with its rapid river and falls, was just outside the door of the hotel. Here artistic pieces are encountered at every few steps in wandering up the glen. A favourite excursion was a twelve-miles' drive up the Glen of Strath Affaric, following the river Glass to Loch Benneveian, through the Chisholm Pass to the shooting lodge of Strath Affaric.

From the hotel a drive of seventeen miles leads to Beauly, and there is a railway from thence to Auchnasheen, where a stage coach and three horses are waiting for a twenty-miles' drive to Loch Maree hotel. Here a fortnight very soon passes away; as, should the weather not prove suitable for the camera, a boat and a couple of men are always ready to give you a chance of a good day's sport with sea-trout fishing, and a luncheon on one of the twenty-seven islands that adorn the loch makes an agreeable change.

From Loch Maree I went to a friend's house on a visit, and of course there was a picnic, camera work forming one of the day's amusements. This event was fixed in a visible form for all time afterwards for friends of the party, and the comical figure shown by one of the ladies ought in future to make those who form groups very careful to look their best.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS.

By J. Vincent Elsden (B. Sc., Lond.), F.C.S.

It has often struck me that it would be of the greatest utility to photographers to have a tabulated list of the chief impurities likely to be present in photographic chemicals, especially as it is not in all cases

easy to find out what substances may be present in impure chemicals to vitiate the intended reactions.

The following, therefore, is an effort to supply this want in the case of some of the more common substances used in photography :—

Substance.	Impurities Possibly Present.	Tests.
Ammonia	Dissolved solid matter	Residue left on evaporation.
	Carbonic acid	Lime-water rendered milky.
	Chlorides	Precipitate given with silver nitrate after adding nitric acid.
	Sulphates	Precipitate given with barium nitrate after adding nitric acid.
	Lime	White precipitate with oxalate of ammonia.
	Lead is often present, derived from the action of ammonia upon flint glass bottles.	Balck precipitate with sulphuretted hydrogen.
Nitric acid	Traces of sulphuric acid	Precipitate given with barium nitrate.
	Chlorides	Precipitate with silver nitrate.
	Peroxide of nitrogen ..	Tinges the acid yellow.
	Iodine may be present if the acid be prepared from sodium nitrate	Blue colour with starch.
Hydrochloric acid ..	Free chlorine, sulphuric acid	As above (Nitric Acid).
	Perchloride of iron	Yellow colour.
Sulphuric acid......	Bisulphate of potash ..	Residue on evaporation.
	Sulphate of lead	Milkiness on diluting with water.
Acetic acid (glacial)..	Water	Does not solidify so readily.
	Sulphurous acid .... } Hydrochloric acid .. }	White precipitate with silver nitrate.
	Aldehyde, or volatile tarry matter	Blackens in the light, after adding silver nitrate.
	Organic sulphur acid ..	Smell of garlic.
Citric acid	Tartaric acid	Add acetate of potassium to concentrated solution. Crystals of potassium bitartrate will separate.

Substance.	Impurities Possibly Present.	Tests.
Pyrogallic acid (pyrogallol)	Metagallic acid	Black, insoluble in water.
Silver nitrate	Free nitric acid	Litmus paper reddened.
Potassium carbonate	Chlorides and sulphates	As above (Ammonia).
Potassium iodide ..	Carbonate of potash ..	Crystals alkaline to test-paper.
	Sulphate and chloride of potash	As above (Ammonia).
	Iodate of potash	Yellow liquid on addition of sulphuric acid.
Potassium bromide..	Similar to potassium iodide	
Sodium carbonate ..	Chlorides and sulphates of sodium	As above (Ammonia).
Sodium chloride	Chlorides of magnesium and calcium	Dampness in damp weather.
	Sodium sulphate	White precipitate with barium nitrate.
Potassium cyanide } Potassium hydrate }	Potassium carbonate (nearly always present)	Dilute acids cause evolution of carbonic acid, which renders lime-water milky.
Kaolin	Chalk................	Effervescence with dilute acids.
Water	Sulphates .... } Chlorides .... }	As above (Ammonia).
	Carbonate of lime	Deposited by boiling.
	Ammonia	Brown colouration with Nessler's test.
Gelatine	Alum................	As much as 10 per cent. of ash on combustion.
	Fatty matter	Separated by precipitation with alcohol.

It would be impossible, in so short a space, either to enumerate all the impurities likely to be present or to give an adequate account of the tests in each case. The foregoing few substances are, therefore, chosen as being not only amongst those in most frequent use in photography, but also amongst those most likely to contain traces of impurities.

EXHIBITION NOTES.

By Payne Jennings.

The exhibition of the Photographic Society of Great Britain for 1881 must, on the whole, be considered successful. At least this will, I think, be the opinion of all who have gone carefully through the

exhibits, and noticed, particularly among the smaller examples, the great advance in artistic taste during the past year. Cleanliness of manipulation is also very remarkable; and this feature is undoubtedly owing to the comparative ease with which the now almost universal gelatino-bromide process is worked. There can be little doubt, also, that the introduction of this process has made a complete change in the character of the work sent for exhibition. But whether or not an advance has been made on the higher grades of the art during the past year is a matter on which there may be some divergence of opinion.

It cannot, however, be doubted that, among the second and third-rate workers, an all-round advance has been made, the late exhibition in Pall Mall making this fact unmistakably apparent.

It cannot be said, either, that there are *few* specimens of the wonderful power of rapid execution of which the new process puts us in possession, because there are many remarkable and praiseworthy examples in this direction; but, when we consider the extent of the power at disposal, the late exhibition must be considered in this respect disappointing.

It should not, on the other hand, be thought for a moment that it is meritorious to photograph anything and everything that happens for the time being to be passing in front of the camera, as, if this be done without previous thought as to what is desired to be depicted, the result considered pictorially must, of necessity, be a failure. And when on this subject it may be well to mention how comparatively few photographs are taken that have been the result of much previous study. This is, however, a matter of great seriousness, and one that must occupy the minds of all those whose ambition it is to produce work that will give something more than temporary gratification, and who believe with the poet that "a thing of beauty is a joy for ever."

CLEAN GLASS.

By W. E. Debenham.

To some it may appear surplusage to describe yet another mode of cleaning glass, and there are those who consider that the interest of the subject has passed away, now that gelatine plates—for which it is assumed that glass which would be rejected for collodion may yet pass as sufficiently clean—have come into general use.

There are many, however, who still use the old process for copying, and I am not one of those who think the cleanliness of glass as a support for the gelatine film a matter of no consequence. I have, in fact, seen green fog developed exactly in the form of a finger mark made upon the plate before coating.

The plan I have found superior to any other I have tried is as follows:—A pad is made by rolling a piece of carpet list round and round until it presents a flat surface on one side of about four inches in diameter. The end of the list is secured by stitches. A few drops of Holmes's ozone bleach are sprinkled on the glass, with a little crocus powder. The plate is now vigorously rubbed, and when a number are thus treated they are washed under the tap and wiped. In polishing I have never found anything to equal a linen glass cloth,

not absolutely dry. With this a cleaner surface may be obtained than with leather or with a perfectly dry cloth, and in much less time. Following the described plan I have succeeded in obtaining clean collodion images upon glass so stained as to be considered useless, negatives taken upon it invariably coming out dirty and stained when only the ordinary method of cleaning was employed.

A BROKEN FOCUSSING SCREEN AND WHAT IT LED TO.

By W. Irving Adams (New York).

A friend who had started on a photographic trip to the Bahamas had scarcely got fairly ensconced in his snug state-room on board the steamer when, in the course of repacking his photographic traps, he had the misfortune to fracture the focussing glass of his camera. This cast a gloom over an otherwise pleasant voyage, and, as he was quite inexperienced in the various methods resorted to by ingenious photographers when accidents befal their outfits, he concluded to devote his "outing" to practical experimenting with his breech-loading "Joe Manton."

But an accident of such a nature need never interfere with the practice of tourist photography. Just consider what are the functions of the ground-glass focussing screen. In the first place, it serves that purpose from which it derives its name—that of an appliance for securing a sharp focus. Secondly, it serves as the means by which the picture is arranged and composed, to show the relation of each tree, building, and foreground object to the space that the picture is to occupy in the photograph. I shall examine these two in detail.

It is a fact recognised by the more experienced landscapists that when a landscape subject is once focussed sharply, and a mark put on the side of the camera to indicate how far it was extended, under every circumstances of scene sharp definition will be obtained if the camera be slid out to that mark and there secured; indeed, any deviation from such an adjustment will cause a loss of sharpness. From this we deduce the fact that, for *mere focussing purposes*, the ground glass may very well be dispensed with; and if it get broken or accidentally left at home no loss is sustained, because by means of the mark in question (which may consist of a delicate scratch across the movable parts) absolutely sharp focussing is secured.

Next, as regards the focussing screen as a means of composing the picture, for seeing how much is to be got in, and soforth. It is in this that the great value of the ground glass lies, and I would not seek to decry its importance for such purpose. But its value in this direction may be successfully rivalled by means of a light brass frame, one or two inches in dimensions, placed on the top of the camera near the front, and working in conjunction with a small brass slip containing an eyehole erected at the back. This slip need not exceed half-an-inch in height by a-quarter of an inch in breadth, and, similar to the frame, may fold down like the sights of a rifle. Now, if the eye be applied to the sight-hole at the back it will see, as if inclosed in a frame, the precise amount of subject that the lens will depict upon the photo-

graph, and in this way the functions of the ground glass, as a means of seeing the composition of a picture, may be dispensed with.

Photographers are very ingenious, and the majority of them will be able with little assistance to carry into execution the foregoing hints, by which they may be rendered largely independent of either ground glass or focussing cloth.

ON FOCUSSING INTERIORS.

By John Harmer.

Much difficulty is often experienced when photographing interiors (especially dark ones) in making quite sure that the focus is properly distributed, and that this has been as satisfactorily performed as is possible with the lens in use, the operation in many instances being very tedious and taking up much time. This trouble is reduced by following a very simple course, which is always applicable; for, if there be no particularly bright objects as required by the method, a candle may be lighted to afford one for the purpose.

After the camera has been placed in position and levelled by means of a circular spirit-level the position of the subject on the focussing screen is arranged with the full aperture of the lens, the stop is then inserted, and the focussing proceeded with. As a typical case, a church interior with a window for its most distant point will serve to illustrate. The stop having been placed in the lens the window is sharply focussed, and then, that being farthest away, the ground glass is drawn outwards till the sharpness is just leaving that object; the nearer portions of the picture so treated will be found to possess all the definition desired. If the bright object be in the immediate foreground the ground glass will, of course, have to be pushed nearer the lens.

As I observed above, a candle may be lighted and put at the most distant or on any principal point, if a general gloom prevail; and this plan of securing sharpness, if carried out with judgment, will be found a boon to those who do much of this class of photography or whose eyesight is not of the keenest; and, the focussing being performed with the lens stopped, one is quite sure of having taken advantage to the full extent of the powers of the instrument.

ON EXPOSURE.

By George Mansfield.

No matter what the process employed to produce a photographic image on a sensitive surface, it is undoubtedly a most important condition of success that the time of exposure to the light be rightly estimated.

In the early paper processes (which were extremely slow) there was less danger of miscalculation than with the more rapid wet collodion; and there is for the same reason less difficulty to calculate the exact exposure with all the dry collodion processes than with the present gelatino-bromide process. The latter, on account of the wonderful rapidity it has attained, demands a determination of time measured no longer by minutes but by seconds and fractions of seconds.

The photographer of today can, therefore, scarcely give too much attention to everything that can assist him in determining the exposure he is to give his plate, recollecting that, whatever latitude it may possess or whatever power he may have of modifying his results by careful development, *perfect* pictures can only be obtained by correct exposure.

A photographic exposure, however, cannot be looked upon as a fixed mathematical quantity, obtainable by a series of calculations more or less complicated. It is at best but a happy medium selected by an experienced judgment from a number of conflicting causes. Each colour, each difference of illumination, each variation of plane in the object or series of objects to be reproduced, has a correct exposure of its own. It is only by combining those in his mind (often unconsciously) that the intelligent photographer determines the one exposure which most successfully combines in a whole these various factors. The general causes which affect the sensibility of photographic surfaces may be reduced to three—physical, optical, and chemical.

The physical causes are those that depend upon light, its distribution, intensity, and chemical action, and are of primary importance, since photography depends for its very existence on the presence of light. At present photographers for all practical purposes depend on the use of the eye to appreciate the variations of light, as we do not possess a photometer that will give us not only the amount of actinic light present at a given moment, but the force of the reflected light that affects the plate in the camera.

It is wonderful what a clear insight into the photogenic value of light may be gained by experience, combined with careful observation. To obtain this the landscape photographer should spare no pains. Above all, let him keep an exact register of every plate he exposes, carefully noting the quality of the light, hour, date of exposure, and lens and stop employed. By the careful study of this register, at the end of a season's work it will be easy to compose a table of comparative exposures for the ordinary variations of light, season, or hour, which, if not rigorously correct, will be sufficiently so to be a very useful guide.

The optical laws which determine the rapidity of photographic lenses are very simple and of easy, practical application. It is by making himself thoroughly acquainted with them that the photographer can form a correct estimate of the power of his various lenses and stops, and compare them one with another.

The rapidity of every form of lens depends on two things—its focal length and its aperture. It increases in the same proportion as the square of the diameter of the aperture or diaphragm, and decreases in inverse ratio to the square of the focal length. To apply practically these laws to the comparison of the rapidity of the various stops of the same or different lenses, it is only necessary to divide the focal length of the lens or lenses by the diameter of the aperture of their respective stops. The exposures for each will have the same proportions one to the other as the squares of the quotients obtained. Let us take, for example, a lens whose focal length is twelve inches, and the diameter of the three stops respectively one, two, and three inches. The result of the division (expressed under the form of the generally-adopted formula) will be $\frac{f}{12}$, $\frac{f}{6}$, $\frac{f}{4}$, and the comparative rapidity of each stop will be as the square of these numbers—144, 36, 16—are one to another.

I have purposely taken simple figures as an example. In practice the calculations will often be more difficult, but the method will be the same. I should recommend the photographer, in order to simplify his calculations when at work, to divide the figures representing the comparative rapidity of his lenses and stops by the lowest of them, so that his greatest rapidity may be represented by the figure 1. For instance: the numbers given above would be divided by sixteen, which would reduce our numbers to $\frac{144}{16}=9$, $\frac{36}{16}=2{\cdot}27$, $\frac{16}{16}=1$; which means that if stop No. 1 require an exposure of one second No. 3 will require nine seconds. Of course, with a number of lenses and stops fractions will occur which will render the formation of a table of the kind a more complicated task; and it would be a great assistance if opticians, in constructing lenses and diaphragms, would avoid fractional numbers. It is, indeed, a great pity that for all scientific purposes the French decimal system is not employed, as it renders every kind of calculation simple and expeditious.

The chemical causes on which depend the sensibility of a photographic plate are—the nature of the process employed, the molecular and chemical conditions of the sensitive surface, and the mode of development adopted. It is well known that each process has a sensitiveness which, though varying slightly with differences of manipulation and chemical modifications, is characteristic of the process. Thus, we may say, in a general way, that waxed paper is very slow, wet collodion rapid, bath dry plates slow, collodio-bromide moderately rapid, and gelatino-bromide extremely rapid. It needs but a slight experience in photographic matters to appreciate the wide differences existing in the exposures required for these various processes.

It is, however, when we come to the ever-varying changes of sensibility that exist in a delicate process like the gelatino-bromide, and which depend on imperfectly-understood laws, that our real difficulties arise. A slight difference in the mixing of an emulsion, a few minutes more or less in heating it, or a passing thunder-cloud may suffice to render one batch of plates more or less sensitive than another. It is only by the strictest attention to every little detail that those who make their own dry plates can hope to attain to anything like a regular degree of sensitivenes. I should strongly recommend them to keep steadily to one formula, to make a large amount of emulsion at a time, and, above all, to keep separate the plates from each batch of emulsion, always trying one or the same test object, and marking the sensitiveness of the lot accordingly. It is only thus that we can hope to counterbalance by change of exposure the ever-varying chemical condition of the gelatino-bromide films.

"WASTE NOT, WANT NOT."

By J. Werge.

A thousand-and-one essays on waste and want have been written, and nearly every phase of the virtue of thrift has received its merited commendation from innumerable pens and tongues until the subject has become wellnigh exhausted; but I think I can describe a mode

of thrift that has not been thought of or practised extensively, if at all, previous to my own observations and experiments.

My practice and experience in the subject under consideration are entirely opposed to theory and assumption, and, doubtless, many of my readers will be as much surprised as I was myself at the results I am about to describe.

Having a number of dry plates sent to me to develope I encountered one that gave no indications of an image after about twenty minutes' immersion in the developing solution—oxalate of iron; so I came to the conclusion that the plate had never been exposed. As the film retained its normal appearance, even after that prolonged immersion in the oxalate solution, it occurred to me that the plate need not be wasted, and that, if thoroughly washed, it could be used again in either a wet or a dry state. I immediately tested the soundness of my conclusions by washing the plate, exposing it in the camera, applying to it again the ferrous oxalate solution, and obtaining a clean and satisfactory negative, and I did not find that the sensitiveness of the film was materially affected.

I afterwards repeated and tested the above experiment with the alkaline pyro. developer by immersing a gelatine dry plate in the pyro. developing solution for about a minute, washing, and exposing it in the camera and applying the pyro. developer again. I obtained a perfectly clear image but somewhat under-exposed, which was, doubtless, due to the yellow tint imparted to the surface of the film by the staining property of the ammonio-pyro. solution.

I carried my experiments still further and placed a plate in the pyro. solution for about a minute, and then, *without washing*, exposed it in the camera, thinking that the process of development would proceed simultaneously with the exposure; but that was not so. On taking the plate out of the dark slide I could not see the image, but on applying the developer a second time the image appeared almost immediately and increased in density.

There was evidently no advantage to be obtained by the latter treatment, but the other two results demonstrated two facts—first, that there was no free silver present in the films; and, secondly, that contact with either forms of developer prior to exposure to white light did not render the plates useless, and that they need not be thrown away as "wastes."

The opportunities for exercising this kind of thrift are not, I should hope, frequent, but they do sometimes occur, as my own experience has proved; and when such accidents do happen I have described a method of reducing the loss and vexation to a considerable extent. Two things must be borne in mind and carefully attended to—first, thorough washing; second, increase of exposure on plates that had been in contact with the ammonio pyro. developer.

MULTIPLYING NEGATIVES.

By Edward Dunmore.

Year after year passes, each one giving birth to a *multum in parvo* of photographic experiences in the form of The British Journal

PHOTOGRAPHIC ALMANAC, to which useful handbook I am invited to contribute something practical and something brief.

Portraiture, landscape, and copying. Under these three designations is comprised the greater part of all photography has to do or has had to do since it was invented, and the methods of doing have, with few exceptions, run on the same lines as at first—so far as a negative having to be taken and a positive copy obtained from it as the ultimate object to be accomplished.

The theme I have selected in response to the Editor's invitation is the multiplication of negatives. We all know negatives have been successfully multiplied by various processes, so what I am about to say cannot possess claim to novelty, but is merely the result of personal experience as to the best way of going to work.

Obtaining the transparency—which is the initiative process—is undoubtedly the key to the operation, as on it depends almost entirely success or failure. The transparency must be produced by contact printing; no other plan that I have ever tried gives anything like so good results. The best copy done in the camera is poor and coarse by comparison. This, then, being admitted—as I believe it will be by all who have had any experience in this direction—we may next consider the best process to adopt. Excellent results can be obtained on collodio-albumen films and on carbon tissue; but, so far as my experience goes, a rather slow gelatino-bromide plate far surpasses anything else, and recommends itself for its convenience to the majority of photographers. A transparency made on one of these plates leaves nothing to be desired for quality of image or ease of manipulation; the only precaution is to avoid making the transparency dense. A thin, well-exposed image is most suitable; one absolutely useless for ordinary printing will give first-rate results. This must be copied in the copying camera by the *wet collodion* process, and a new negative will be obtained equal in every respect to the original; in fact, sometimes better if the original have been somewhat lacking in pluck. I prefer wet collodion in this case, as the operation is more under control, for considerably more care is required to obtain a transparency suitable for contact printing than for copying in the camera to secure a perfect result.

THE ACTION OF ALCOHOL ON CARBON PRINTS.

By W. B. WOODBURY.

IF a carbon print that has been developed on glass be half immersed in strong alcohol for an hour or more, and then allowed to dry, it will be found that the half so treated will, on being examined under a magnifying power, possess much greater sharpness than the half that has been allowed to dry in the ordinary way. The portion so treated will be found to possess also a fine granular surface of a velvety character, while the remainder will be smooth and glossy.

This effect is doubtless due to rapid contraction of the gelatine under the influence of the spirit, and this peculiar property can be made exceedingly useful in many ways. For enlargements the result will be much finer and sharper; and for all description of reliefs for block printing, Woodburytype, or photo-engraving the sharpening of the

image by this means is of great importance. I believe Mr. George Smith was the first to utilise it in Paris for the photoglyptic process.

Now, if we print and develope a carbon print on a rough or granular paper, and then treat it in this manner, the resulting proof will be found to possess a considerable amount of what is called "tooth," and be admirably adapted for finishing in crayons or powder colours. I trust some of your readers may make use of this suggestion.

ON THE PREPARATION OF TRANSPARENCIES FOR THE LANTERN.

By Seymour Conway.

Another photographic season has come and gone, and the annual request for a contribution to the Almanac, as usual, comes with the approach of the winter months.

But what to write about? is the difficulty. "There is nothing new under the sun," and such may, indeed, with truth be said of photography this year. That gelatine plates have been still further improved was apparent to everyone visiting the recent exhibition of the Photographic Society of Great Britain at Pall Mall. But as it is more than probable that the Almanac will be full to overflowing with numerous formulæ and "dodges" for the preparation of the most sensitive plates, it seems superfluous to increase the number; and yet, when an amateur photographer uses nothing but gelatine, what other topic is there to discuss?

It is this fact that compels me to write a few lines on the preparation of suitable plates for lantern transparencies, it being a very agreeable occupation for the winter months; and, having used both gelatine and unwashed collodio-bromide for this work, I will just jot down, for the benefit of any readers who may never have attempted this branch, my experience, together with the difficulties which arise.

In using gelatine (and there are many advantages in the use of this universal favourite) the chief difficulty is to prevent the discolouration of the film if alkaline development be resorted to; while, if recourse be had to ferrous oxalate, it is (at least in my experience) impossible to prevent an opalescent scum from forming on the plate. In fact, so great is this defect apparent that I have given up this developer in favour of alkaline pyro. To ensure the transparency of the high lights I had recourse to iodide in the emulsion, and have used a formula containing—

Potassium iodide	1 grain,
Potassium bromide	14 grains,
Silver nitrate	20 ,,
Gelatine	30 ,,

to each ounce of water. I have used the Swiss gelatine lately—procurable from Messrs. George Houghton and Son, Holborn—and like it extremely. It is exceedingly fine, and causes the emulsion to flow like collodion over even the largest plates (9 × 7) I use. I have also adopted the plan of precipitation with alcohol, which for small quantities of emulsion I find very convenient.

In order to obviate as much as possible staining of the film in development I recommend the use of dry pyro. (not an alcoholic solution),

and the full dose of ammonia and bromide mixed at once, and only just before using, so as to ensure rapid development. As it is comparatively easy in this work to calculate the exposures correctly, there is not the same necessity for care.

Pyro.	3 grains,
Ammonia	4 drops,
Bromide	4 grains,
Water	1 ounce,

I have used very successfully. The picture flashes out immediately, and is fully developed in twenty to thirty seconds.

The collodio-bromide process I have used for this purpose is the one so ably described by the Rev. Canon Beechey in the ALMANAC for 1876. There is no difficulty when using this in keeping the high lights clear and clean, and the only drawback is want of rapidity, the exposures requiring to be at least six times as long as for gelatine. I recommend the same developer, only reducing the ammonia and bromide to two grains and two drops respectively.

Although I am aware there is nothing new in all this, I have found not only great enjoyment in preparing these slides but also much pleasure in exhibiting them on the screen; and I can assure any of the readers of the ALMANAC who may be hesitating as to whether they will commence this work, that it is a very pleasant and agreeable way of exhibiting to one's various friends in the winter evenings the delightful spots you may have visited during the summers—past for ever!

A VERY QUEER SITTER.

By "CLIFF."

I SUPPOSE we all have queer sitters sometimes; in fact, I often wish that I could now and then get one that wasn't queer. I think you will admit that the one I am going to write about was rather more queer than usual—so much so, in fact, that after settling the job I felt *very* queer myself.

One evening, just as I was leaving business, I was told a lady wished to see me, so I ran down from the gallery to the reception room, where I saw, seated on a chair, and looking the very picture of dejection, a lady dressed in deep mourning. "Ah!" thought I, "an order for an enlargement, I suppose," and mentally congratulated myself. Judge of my surprise when the lady looked up and asked—"Can you photograph a cat, Mr. Cliff?" "Certainly," I responded. "Because," continued the lady, "I have one that I wished photographed tomorrow morning. Might I ask your charge?" I replied ten shillings per dozen, and was again surprised by her saying—"Oh! that is card size, I suppose; but I want something larger." I suggested cabinet, and she said they would do. I intimated that they were twenty-five shillings per dozen, little thinking that there *could* be a person in existence willing to pay that sum for portraits of a feline pet.

But there were still more surprises in store for me, for she would require it in two positions—"if it would make no difference!" "Merely five shillings more," I responded. "Oh! thank you; then I will come and bring her at eleven to-morrow." And so saying she left me to muse

and wonder whether the millenium had arrived, or whether the whole affair was a "sell." Thirty shillings for a dozen cabinets of a cat! I must be dreaming! I pinched myself, and found to my regret that I felt the pinch, and so must necessarily be awake.

Then a light broke upon me. It must be some very grand cat—one that had taken prizes at the Crystal Palace or the North Woolwich Gardens! "Yes," thought I, "here is the key to the mystery." Elated with the idea I thought I would run up to a theatre for the evening. I dressed myself and did so. Arrived there (it was the "Cri") I took a seat and procured a programme. I gazed at it in horror and amazement, and pinched myself again, for the words that met my eyes were—"Where's the Cat?"

As the play progressed I became much amused at the strange coincidence which should have led me to that house; and when it was all over I went back home to bed to have my sleep troubled with horrible visions of black cats, white cats, tabby cats, Tom cats, she cats, and all other kinds of cats, not, however, including the "Bo'sun's daughter."

At length came the morning, and the first thought that crossed my mind that morning was—"Where's the cat?" I was ready for the feline sitter by half-past ten, and sent my favourite dog, "Turk," away to a relative for the morning, for fear he and my sitter should quarrel. Eleven o'clock arrived, and punctually at the moment up came a cab, out of which my lady visitor of the preceding evening alighted, closely followed by a maid, who bore in her arms *a small coffin!* Imagine my horror, if you can. "Where's the cat?" thought I. My appointment was not for a coffin or for a dead child, but for a cat!

They came up stairs, and I saw the lady had been crying. "Oh! Mr. Cliff," ejaculated she between her sobs, "I for—forgot to—to tell you la—last night that my pup—pup, poor pup—pup—pussey was dead!" "Oh, lor!" thought I, "what *is* the world coming to?" The coffin was opened, and from it was extracted a fine specimen of an Angora which had been defunct for some time, as indicated by her appearance and aroma. She was laid carefully on a black velvet cushion bordered with white lace, and the said cushion was then plentifully sprinkled with *eau de Cologne*.

Well, I took that cat in four positions; but, mind you, *I* didn't pòse it—not I! I felt ill enough without touching it, and the lady made me feel worse by her constant application of cambric and mutterings of—"Poo—poo—poor puss!"

Thirty-five shillings I pocketed over that job, with five of which I sent out for a bottle of brandy. Now I can never hear anyone say "Where's the cat?" without a shudder.

WET COLLODION *versus* GELATINE IN PRACTICE.

By H. Constantine Jennings.

The arrival of a request from the Editor of this annual for a contribution to its pages caused a feeling almost amounting to consternation in my mind; for what was I to relate that had not already been well told? However the thought of that refuge for the afflicted—that all-

absorbing gelatine—came to the rescue, and restored somewhat of my disturbed equanimity as I reflected that at this time of the year anything connected with the new departure in operating would perhaps prove welcome to the few, if not to the many. As an ounce of practice is often worth a ton of theory in matters photographic, I purpose giving the result of my experience in working the gelatino-bromide plates in a rather extensive business.

I am a "damp" man, and still believe in the bath giving better results than any dry plates I have yet used, provided sufficient exposure can be given; but I think it very possible that at a time perhaps not far distant I may have cause to modify my views or actually reverse them.

But, to come to practical matters. First, I believe in abundance of light in the dark room. My window contains three square feet of Chance's double silver-flashed orange glass; in front of this I have a piece of ground glass, which diffuses the light and renders it far more pleasant. It is much better lit than very many "dark dens" usual in the days of the wet process alone. I can read fine print six feet from the window with ease. I also like to give a full exposure in the camera, so that the detail comes up quickly and easily under the influence of a comparatively weak developer. In general I use five drops of solution of ammonia and bromide (Wratten's formula), one grain of pyro., two ounces of water, and I persevere with this unless, from insufficient exposure, the detail appears too reluctantly, when I add five drops more of the ammonia.

With this weak developer and by giving sufficient time a good negative may be coaxed up without any fear of fog. Last November, on a dull afternoon about 3.30 p.m., I had to take a group—father, mother, child two years' old, and baby in arms. Two plates were spoilt by the movement of the two-year old. To the third I only gave four seconds, although I intended giving ten. I proceeded to develope, but after six or seven minutes I had only got the high lights out. Thinking it would be spoilt in any case by under-exposure I left it in the dish, went about other business, and forgot all about it till three-quarters of an hour had elapsed. I then had a look at it, and to my surprise I found a well-detailed negative. Subsequent printing showed that it was quite equal to many taken under much more favourable conditions. I may safely say that I have had more failures from too hasty or too strong development than from any other cause. The point I wish to insist on is gradual, patient development, giving ample time for deciding what to do. It need not necessarily be tedious. With well-exposed plates I generally spend five to seven minutes in development. The same method has answered well in my hands with five different brands of commercial dry plates, and I obtain negatives more nearly approaching good bath ones than by using the more energetic developers.

In all dry plates I have yet tried I find the greatest falling off in quality is in taking subjects in which a large quantity of shadow occurs, as in full and three-quarter lengths with dark backgrounds. The nearest approach to perfection is got in vignettes, especially of ladies and children in light dresses. There is, too, often a flatness, sootiness, and want of sparkle in negatives from subjects where

masses of shadows or dark objects preponderate—very different to the same picture produced by the bath.

PHOTOGRAPHIC POT-POURRI.

By R. N. Hormazdji, M.R.C.S., L.R.C.P.

Intensifiers for Gelatine Plates.

So many photographers have complained of negatives fading, spotting, and assuming a patchy-brown colour when intensified, that I think a few words about intensifiers will be acceptable to those who have somehow failed in intensification of negatives. Though, of course, we are all most pleased when a negative needs no after-treatment, yet it does happen that many a negative full of detail, soft, and harmonious is deemed useless because not quite dense enough; and Mr. Warner tells us that gelatine negatives are generally full of detail but defective in density. I do not by any means refer to those dead, flat negatives obtained by immense over-exposure; such are best treated by Mr. ——'s (I forget the name) formula, viz. :—A needle drawn from the top left corner to the bottom right ditto, and from the top right to the bottom left.

The following are, perhaps, formulæ known to many, but the mode of using has, I daresay, almost as much to do with success as the formula used.

1st, and best—*The Mercurio-Cyano-Silver Intensifier.*—Of this I use two formulæ—one strong, the other weak.

Formulæ for Strong Intensifier :—

1.

Bichloride of mercury	96 grains.
Bromide of potassium	96 ,,
Distilled water	12 ounces.

2.

Crystallised cyanide of potassium	90 grains.
Nitrate of silver	96 ,,
Distilled water	12 ounces.

Shake well, and allow to settle; keep the precipitate of cyanide of silver always at the bottom of the bottle.

Formulæ for Weak Intensifier :—

A.

Bichloride of mercury	90 grains.
Bromide of potassium	30 ,,
Distilled water	12 ounces.

B.

Crystallised cyanide of potassium	40 grains.
Nitrate of silver	45 ,,
Distilled water	12 ounces.

All the above may be used over and over again. Before describing the mode of using the above I may point out cause of failure number one, viz., the very common use of *ordinary* cyanide of potassium instead of the pure *crystallised* variety, called also "cyanuret of potassium."

Cause of failure number two: insufficient washing after fixing. I must insist—if the foregoing are to be fairly tried—that a thorough washing be given to the plate after fixing, and again a *thorough* washing after the alum and hydrochloric acid bath. Three or four hours' washing after fixing (the plate should remain in the fixing bath at least twenty minutes) and one hour's soaking after the alum bath is not by any means too much. (Those who use frilling plates need not fear the prolonged immersion if, after development and before fixing, they soak the plate for five minutes in a solution of *chrome* alum—*not* ordinary alum—of a strength of six grains to the ounce of water, and then wash thoroughly before fixing.) What is the first great rule to ensure success in gelatine work? Wash thoroughly. And what is the second? Wash thoroughly. And what is the third? Wash thoroughly.

This being done, immerse the plate in the solution No. 1 or in A, according to the density required. Let it remain in till of a uniform yellowish-grey or white colour. Then wash well for a quarter of an hour, finishing with a rinse of distilled water. Immerse it now in No. 2 or in B quickly, and having a clean camel's-hair brush ready to pick off air-bubbles if they form on the plate. The plate will blacken at once, and when the intensification is complete *there will be no white showing at the back of the negative.*

Here I point out cause of failure number three. If the plate be removed from the second bath while *any* white is showing at the back the result must be a patchy failure. Again: there is danger in leaving it in too long, for then the density is reduced. This remembered may be useful in the case of a too-dense result. Avoid *Scylla*, but don't forget *Charybdis.*

I do not think a more beautiful intensifier than this exists; it gives results "equal to wet plates," if that be any criterion of perfection. Half-tones are well rendered, and there is no approach to chalkiness in the prints. If these directions are carried out in their integrity success must follow.

2nd. *The Mercurio-Ammoniacal Intensifier.*—This may be used with very good results, if care be taken to wash well after fixing and after the mercurial bath, also taking great care to keep air-bubbles off the plate. The best formulæ are appended:—

a.

Bichloride of mercury	100 grains.
Bromide of potassium	45 ,,
Distilled water	12 ounces.

β.

Ammonia, sp. gr. ·880	6 drachms.
Water	12 ounces.

To use: wash well after fixing and alum baths, then immerse in *a*, and allow it to remain in till nearly white; now wash thoroughly, finishing off with distilled water; and, lastly, put the plate in ammonia bath *β* till all the white has disappeared from the back of the negative.

This intensifier gives a different colour when compared with the first described, it being of a perfect black, with no approach to staining or to brown or drab colour. Still I consider it inferior to the cyano-silver intensifier.

Vogel's Emulsion.

I have completely failed in the use of this emulsion. The plates after drying appear as if they are simply powdered over with fine precipitated bromide of silver, each particle of bromide being clearly discerned by the use of a not powerful magnifier. When exposed and finished the image appears as if formed on ground glass. Most carefully did I follow the directions as to heating (using the exact chemical thermometer), shaking, allowing to settle, and even filtering; but I failed, and failed most miserably. If any of my readers care to see the prepared plates they can do so, as I have kept them as a memento of the complete failure of collodio-gelatine emulsion (in my hands) as hitherto prepared.

Natural Clouds in Negatives.

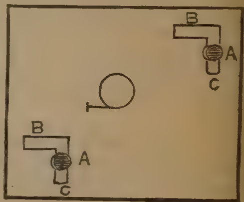
To obtain clouds in the same negative with the landscape is, of course, most desirable. To do this there are two methods known to me:—

1st. Mr. Burton's plan of fitting the cap of the lens with a cabinet mount perforated for its reception, and raising it when exposing as if it were hinged on by its highest edge to the highest point of the hood of the lens.

2nd. One described to me by Mr. Baynham Jones, viz.:—When, on developing, the high lights with the sky appear immediately, tilt the dish up, so as to make the edge of the developer course along the horizon, leaving the sky completely out of the solution. With a clean, broad camel's-hair pencil just move about the developer at the horizon to prevent any markings. I have not yet tried this, but mean to do so. One would be inclined to think that the exposure of the sky whilst wet with the pyro. solution to the oxygen of the air would cause staining. I do not know.

Combined Double-Motion Rising Front.

Not so well known or appreciated as it ought to be is a perfect front invented by Mr. Baynham Jones. It is used by a few amateurs here, I believe, but not by so many as it ought to be. The annexed diagram explains it, I hope, sufficiently and efficiently. A A milled-edged brass fixing screws; B B slits for horizontal movement; and C C slits for vertical movement.



Alkaline Developer.

Having experimented a good deal with different developers I can recommend the following as a useful one. I always use it and find it very reliable, of course varying the proportions for various plates and exposures:—

Stock Pyro, or P.

Pyrogallic acid	1 grain.
Glycerine	15 minims,
Methylated alcohol	45 ,,

Stock Bromide, or B.

Bromide of potassium	10 grains.
Water	1 drachm.

Stock Ammonia, or A.

Liq. ammonia, sp. gr. ·880	16 minims.
Water	1 drachm.

To develope :—Use half-a-drachm of each of the above solutions to each ounce of water. The proportions will then stand as follows for each ounce of developer :—

Pyro	½ grain.
Bromide	5 grains.
Ammonia	8 minims.

A Useful Toning Bath.

This bath should not be used for at least forty-eight hours after making, and should be kept in the dark. It gives every variety of tone :—

Chloride of gold	1½ grain.
Acetate of soda	30 grains.
Prepared chalk	1 drachm.
Saturated solution of chloride of lime	1 drop.
Water	7 ounces.

Into this bath all prints may be put without *any* previous washing. I can imagine the professional saying—"But the previous washings give valuable residues." I say these residues can easily be obtained from the toning bath, without the labour of three or four washings, and then precipitating the washings. My plan is, when the toning bath is used up, either—1. Add dilute hydrochloric acid, and thus precipitate the silver as chloride, then filter; this leaves the precipitated silver chloride on the filter, and the clear filtrate may be then treated in the ordinary manner to obtain the gold. Or, 2. To the old bath add dilute hydrochloric acid and a solution of sulphate of iron. This precipitates both gold and chloride of silver. To the mixed precipitate add the nitro-hydrochloric acid; this will dissolve the gold and leave the silver as chloride, which can then be filtered out.

A Novel Unipod Camera Stand.

Mr. Conan Doyle, in a most interesting, amusing, and well-written article, describes a novel stand used by him. It is simply a single pole with a spike of iron three or four inches long at one end, and a ball-and-socket arrangement for attachment to the camera. Merely stick the point well into the ground and the stand is ready. This might not be allowed in the interior of a cathedral, but for pure landscape work is most useful, light, and rigid. I wonder this has not been described before. I hope Mr. Doyle—who I am glad to see is a medical amateur—will favour us with more from his pen.

TWO WRINKLES.

By H. Houlgrave (Liverpool).

How to Prevent Albumenised Paper Blistering.

When the prints have been printed and trimmed to size plunge them one by one into a flat dish containing a few ounces of methylated

alcohol. When all have been immersed drain off the alcohol, returning it to its bottle for future use. Fill the dish with water, transfer the prints to a larger vessel, wash them carefully for a few minutes in three or four changes of water, and then tone, fix, &c., in the usual way.

How to Filter an Emulsion.

Take a piece of fine sponge, and with a pair of scissors trim it into the shape of an ordinary bottle cork, but slightly more conical, and of such size that it will be a moderately-tight fit for the neck of the funnel to be used. Now, with a needle attach a short piece of thread to the thinner end and it will be ready for use. When required for use moisten the sponge with water, pass the ends of the thread through the spout of the funnel, and gently pull it into the neck. Now fill the funnel with hot water, and when this has run through pour in the emulsion. When done with remove the sponge from the funnel, rinse it in a few changes of hot water, and then set it aside for future use. It will serve for a great number of operations, and may be expected to last for at least a year.

If a tuft of cotton wool be doubled into a nice round plug it may be inserted into the neck of a funnel in the same way as the sponge, and it will be found a more economical and, in every way, a better medium for filtering such things as concentrated solutions of pyrogallic acid or silver than paper. It also answers admirably for filtering collodion; but in this case a little ether, instead of water, must be allowed to run through the filter before pouring in the collodion.

By pulling the filtering medium into the neck of the funnel, instead of merely pushing it, as is usually done, some very important advantages are gained:—1. The degree of compression of the medium can be regulated with the greatest nicety, and the filtration rendered thereby either as slow or as rapid as may be desired. 2. The medium, being comparatively loose at the top and tight at the bottom, is very little liable to become clogged and the filtration stopped. 3. Being well placed in the neck of the funnel the medium never by any chance slips.

DEVELOPING.

By Henry C. Price (New York).

What I am about to write is nothing new, but a combination of means used by others. In the first place, I am an advocate of a generous exposure, and the formula used for stock developer is as follows:—

Water	20	ounces.
Oxalate of potash (neutral)	5	,,
Bromide of potassium	20	grains.

If this do not turn blue litmus red add oxalic acid until it does. The second bottle contains—

Water	20	ounces.
Protosulphate of iron	5	,,
Sulphuric acid	20	drops.

Filter both. Provide two nasal *douche* bottles, and into one pour (say) twenty-two ounces of the oxalate solution. On the top of this pour about half-an-inch of oil. I use machine oil. Then pour in two and a-

half ounces of the iron solution. This forms the developer. When developing is completed filter the solution back into the bottle. This developer is used over and over again. At the end of a month add bromide of potassium to the solution at the rate of two grains to the ounce. Set this bottle aside, and mix fresh developer in the other bottle in the same proportion as the first one mixed. This I will term the "new" developer. And now to manipulate.

The plate is developed with the "new," after the detail is out; and if I require density this developer is poured off and the old developer applied. This gives fine density. Should still greater density be required I fix in the following solutions combined:—Water, three ounces; hyposulphite of soda, one ounce; in another bottle one ounce of protosulphate of iron in three ounces of water.

CHLORIDE OF GOLD FOR PRINTING, AND A MOUNTING MATERIAL THAT WILL NOT COCKLE THE PAPER.

By Matthew Whiting.

These two manufactures are so extremely simple and easily prepared that I think any amateur photographer who once follows the receipts now given will not again go to market for the manufactured articles.

Chloride of Gold.

Take an Australlan sovereign, and bend it so that it will go into the mouth of a small flask holding about four ounces. Add five drachms of hydrochloric acid, one drachm of nitric acid, and six drachms of distilled water. Place the flask in a glue pot or any other suitable vessel to keep it hot without the steam issuing from the flask and causing waste. In about five or six hours the acid will have ceased to act. Pour this off, and add similar quantities as above, which in a short time will fully dissolve all the gold, leaving the silver as a white sediment. Mix both together, and add a few ounces of distilled water at a time to the silver, which will settle, and pour off till it is quite free from gold. These are to be made up finally to twenty-one and a-half ounces, or one grain of gold to a drachm.

When required for the toning take one drachm for each sheet of paper (or less, if well managed)—say for ten sheets of paper one ounce of solution of gold and ten or twelve ounces of distilled water, and powdered carbonate of lime when stirred up sufficient to leave a small sediment after remaining till the following day. Then carefully pour off all the clear gold solution (but do not filter). Place in the toning bath about ten ounces of distilled water and three or four of the gold solution, and commence with about a dozen prints. When these are toned take another dozen, and add a little more solution at a time to keep up the strength till all are finished. The silver should be thoroughly washed out of the prints before placing in the toning bath, and sufficient time given to the prints to tone slowly, which will then be permanent. This plan I have followed for many years.

Mounting Material.

Take good Scotch glue, break it into small pieces, and cover with cold water to soak for four or five hours. Pour away the water and

melt the glue so as to dissolve in the least quantity of water; then add methylated alcohol little by little, stir till it is reduced to about the proper consistency, and filter through calico. For use warm the mounting material, which should not be too thick, and apply to the back of the prints with a hard, dry brush. The alcohol not only keeps the glue from decomposing, if kept in a wide-mouthed, stoppered bottle, but does not swell the paper and cause it to cockle.

CONCERNING BABIES.

By E. DEBENHAM.

LET us tread softly here, for we are on hallowed ground! This is a topic which the writer would handle tenderly and with a certain amount of fear and trembling. There are two potent factors to be taken into account:—First, the Editorial scissors and waste basket; and, secondly, the British matron. It is just possible that the humble writer hereof may have to flee to the first-named power for refuge from the incensed second ditto; for the British matron is proverbially sensitive on the subject of baby, and is apt to "come down like a hundred of bricks" upon the presumptuous scribbler who should venture to do ought but "write up" her darling. An ultra-scrupulous stickler for the bare truth is simply nowhere when the merits of baby are on the *tapis*. The writer calls to mind, however, the fact that the British matron is not, as a rule, a great reader. Bless her! she has something else to do. And if she were, it is highly improbable that she would take up THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC unless her lord and "master" (save the mark!) should have black fingers and incautiously leave this annual about, in which case that good lady would probably remark—"Stuff and nonsense! what can *they* know about babies?"

Revenons à nos moutons—"lambs," I should say. Baby must be photographed, and is accordingly introduced to the studio. Our friend Smith is to have the honour of the small visitor's custom. Baby is in high good humour. Soft murmurs, and gentle, cooing sounds issue from a smiling mouth, displaying two or three tiny, milk-white teeth, and the little one dances up and down and crows with delight at the novelty of the scene. While nurse or Mamma is adjusting bows and sash Smith is silently and quietly placing his camera, moving a chair into position and arranging the light. He places within reach, but *out of sight*, a number of toys.

Perhaps it is worth while here to digress a moment to "take stock" of them. There is a hare that beats a drum, a Punch squeaking an unearthly squeak, a woolly lamb, likewise possessed of extraordinary vocal gifts called into action singularly and, one is bound to say, unwarrantably enough, by rapidly moving its *tail* up and down after the manner of a pump handle—(I fancy the artist who invented the lamb with the vocal tail must have derived his inspiration from watching his offspring operating on the "harmless, necessary cat," and must have noted the wail that followed every pull on the part of the young experimentalist)—and many others too numerous to describe. In a cupboard close at hand there is, in fact, a whole armoury of toys suited to children of all

ages. At present, however, Smith has only the baby articles in use. "Now," says he, to Mamma, "I am quite ready. Do not attempt to attract the baby; let your nurse hold her from behind the chair—so! She will not be seen. Now, please, look out of the window and do not touch the baby, for you cannot tell what instant I shall choose for my picture."

This is a very necessary caution, for Smith remembers how that very morning a golden opportunity for a charming picture had been spoiled by an officious nurse, who sprang forward to adjust a bow at the very instant when the little one was still and the cap just removed from the lens. It was ten minutes before such another opportunity presented itself.

Now is the moment! Smith is standing by the camera, his hand is on the cap, and with the other he is working one of the vocal toys. Baby's blue eyes open wide with wonder. There is something familiar about the squeak of that lamb, and Smith smiles so pleasantly that the little one smiles in return, slightly raising a plump little hand with tiny pink fingers. There is an almost imperceptible click, and Smith says—"You may take her up, if you please; but keep her amused in case I want another."

Now Smith, as he leaves the studio for the dark room, does a very singular thing. He gathers up his toys, and, placing them in their cupboard, carefully turns the key, which he puts in his pocket. Does he think that highly-respectable British matron is capable of feloniously appropriating his toys on behalf of her babe? No; not at all. But he knows from experience that the moment his back is turned that estimable lady will spread out all his treasures before her darling; so that, should it be necessary to return to the charge, he finds the child is satiated with good things, and will have nothing to do with a man who has no new toys to offer. His attraction in the eyes of that infant is gone—his glory is departed! We will suppose, however, that the first plate has been successful, as is often the case. Nevertheless, the precaution of locking up the toys is a very necessary one.

There are babies *and* babies, and the sample sketched above is like the fine fruit in a basket of strawberries, which, curiously enough, always finds its way to the top of the pottle, the unsound and damaged article modestly hiding at the bottom. We have gathered the dainty, sweet fruit; let us go farther down in the basket.

Enter baby No. 2, *and party*. Two or three members of the softer sex (it always takes a mamma, two aunties, and a nurse) conspire jointly with the tyrant of the hour to make the artiat's life a burden. The baby is (we will say) a boy. He is big, fat, and truculent. On seeing the mild and insinuating operator he gives a convulsive start, clutches his nurse round the neck, and, burying his flat nose in her bosom, utters one long, stentorian roar. Smith is not unused to this sort of demonstration and is not disconcerted; and, knowing the entire futility of speaking to or noticing the child, he busies himself about his camera and *toys* again, and in a few moments is standing at the "ready." If Smith were to look at or speak to the amiable infant at this stage there would be a fresh business of bellowing, petting, and waiting to be gone through; so that, when the little sitter has been induced to occupy the proper chair, Smith is only apparently taking up

his toys one by one for his own amusement. Meanwhile the fractious little one has been jammed deeper down in his chair, his tears wiped away, and his flat nose aforesaid judiciously manipulated. He now begins to take a haughty and offended interest in the performances of a singular creature held close over the camera. It is a hairy, monkey-like "Jack-in-the-Box," who springs up with a thin squeak. That moment of interest, however, is long enough. An exposure has been made, and a fair negative of a very unamiable subject secured. Over such unpromising materials as this it would be a mistake to throw away many plates, and a sharp and tolerably-pleasing picture should satisfy the proud parents. At the same time it is quite possible that the child will improve in expression, and by-and-by unbend to a certain extent. He may even condescend to smile at the person who has been taking such pains to amuse him by indefatigably working his mechanical toys. In this case the operator must bide his time, and *may* be eventually rewarded by obtaining a really agreeable picture, to his own great credit and the delight of his patrons.

The daily experiences of a busy man bring him into contact with a surprisingly-large number of subjects of almost infinite variety, and it would be a curious and, perhaps, interesting study to classify, name, and label the leading varieties of the large and important family of baby and other sitters.

This leads, however, to "fresh fields and pastures new," so we will stick to our text and wind up by simply stating an accepted truism that, "concerning babies," a successful operator should possess great good temper, patience, and tact, and must patronise the toy shops liberally. Perhaps the greatest mistake that can be made is to throw away plate after plate—firing away every barrel, so to speak, at once. It is better to wait a-quarter of an hour if necessary for the *right moment*, which, in almost every case, will come, rather than to be contented with a disagreeable expression or an awkward pose.

GREY VIGNETTES.

By W. Heighway.

The ordinary vignette is undoubtedly a most pleasing style of portraiture, but very often the large mass of white surrounding the head detracts from the artistic effect of the picture. The half-tones suffer, and the high lights are often completely killed by the white of the background. Darkening this to the tint of the vignetted background of the negative we get a picture which leaves nothing to be desired for delicacy; and the beauties of the picture, instead of being diminished, are considerably heightened.

To print in a really perfect background considerable skill is requisite. The rough method of placing a piece of cotton wool over the print and exposing the background to light can never give good results, as so many indifferent specimens daily exhibited forcibly testify.

The method I am about to describe will require a little practice, but the time bestowed will be fully compensated by the results to be obtained from it. The vignette made will give round the head a shaded strip of background, and to this the printed-in ground must be made. Place

the vignette between two clean glasses, and rest these on the palm of the left hand. An oval piece of card somewhat smaller than the picture is placed over it, and in diffused light the card is kept in motion, to regularly cover the entire picture, by a finger of the right hand, while the glasses, with the picture between, are rotated by movement of the left hand.

Although difficult at first, it is surprising how soon deftness may be acquired, until with impunity the greying may be done in strong sunlight. This, however, is not to be commended, the effects obtainable in diffused light being always far more beautiful. The printed-in ground should never be darker than the original to produce a halo round the head. The effect is objectionable in the extreme.

A PLEA FOR SILVER PRINTING.

By J. Pollitt.

The great simplicity of silver printing on albumenised or other paper, combined with the rare beauty of the results obtainable under the most careful and approved manipulations, and, when negatives of great excellence can be used, are points of sufficient force to commend the system as still worthy of universal practice, notwithstanding the marvellously-rapid march towards perfection, during recent years, of several mechanical processes of high merit, and in so-called permanent monochrome.

Far be it from my intention to say one disparaging word touching the development of new ideas. The origin and history of photography—which in a practical form dates no farther back in the past than some forty-five years—is a striking instance of the force and versatility of genius when applied to the solution of difficult problems, or, perhaps, I ought rather to say, the subordination of newly-discovered and apparently-refractory powers, to the ends of order and usefulness.

In no other department of progress has the principle of "the lion lying down with the lamb" been more clearly illustrated than in the rapid building up (and now almost universal practice) of the gelatine process—a process which at the very outset assails and upsets one of the cardinal points of the preceding race of dry-plate men; for, was it not an axiom with them that dry films could never be made anything like so sensitive as wet ones, for the simple and all-sufficient reason that the pencils of light forming the image would more thoroughly permeate the film in a wet state, in consequence of its porosity, than it could ever be made to do on a hard and dry film? Therefore, all efforts were chiefly directed to the production of films which could either be retained in a state of partial desiccation or else to discover some compound by the application of which the molecules of the dried film should be kept indefinitely in a porous condition analogous to that obtained in the wet collodion state. Yet we have in gelatine—a substance so compact and flinty in its dry state that it can be impressed into moderately-hard metals by means of hydraulic power—a vehicle which, used as a dry film, retains the haloid salts in a state of sensitiveness never dreamt of by the wildest enthusiast ten years ago.

With regard to photographic printing, however, none of the existing mechanical processes approach so nearly in practice to the simple lines of

silver printing as does the gelatine process to that of its numerous forerunners. For that reason, if for no other, I opine that silver printing, although at times much maligned, has still a long lease of existence before it, and the extensive manufacture and sale of albumenised paper—never perhaps so great as at present—certainly supports such an opinion.

But has silver printing been deservedly decried? Or has it not been due to hurried and unscrupulous treatment, in the haste to become rich of former times, that so much of the work of an earlier period has now passed into "the sere and yellow leaf," and thus the impression gradually gained ground in the public mind that all silver prints must necessarily fade? The term "permanence" has a meaning of considerable elasticity, and may in a sense be said to be altogether a misnomer when applied to art productions either in monochrome or colour; for no work of art containing all the gradations of tone necessary to make it rank as such will retain the bloom and freshness of its original state through all succeeding time.

Admitting that there are sufficient grounds for a general suspicion or mistrust of their durability, the significant fact remains that silver prints are not infrequently met with which have stood the test of time for twenty or thirty years, under varying atmospheric and hygroscopic influences, when no undue care has been taken for their preservation. Others, again, have lost some of their original vigour, or, perhaps, to speak more correctly, have become toned down during the first two or three years of their existence, but have retained that condition during a much longer after period without any further change. I have many prints in my possession illustrating both of these types, one of which I think deserves special mention as being one of my first essays in printing, produced shortly after the introduction of albumenised paper. It is dated January, 1856, and was toned by the old *sel d'or* method, by which plan both toning and fixing were accomplished at one operation. By reason of this treatment it ought, according to the light of modern progress, long since to have faded; yet it is, to the best of my judgment, precisely in the same condition it was twenty-two years ago. It is of a sepia tone, and the paper itself slightly jaundiced, which was invariably the result of that mode of treatment—an effect, by the way, rather prized by artists. I have also in my mind's eye at this moment a portfolio of beautiful prints in the possession of a friend, and produced for the most part at a somewhat earlier period than the one above referred to. They were also chiefly toned and fixed by the same single operation. Yet these prints, partly by reason of the slightly-albumenised paper on which they were printed, and partly owing to the peculiar colour imparted to them by the *sel d'or* bath, have at this day much of the charm and character of fine old mezzotint engravings.

Since, therefore, such an anomaly exists as the fading of many silver prints, whilst others have retained their pristine purity through the severest test of time that can at present be applied, it may be worth while to inquire into the causes of failure, and in relating my own views as to the conditions likely to lead to success the reader may readily draw his own inferences.

In the first place, successful printing, I need hardly say, depends largely on the character of the negative itself, which must combine softness and vigour in a way that will allow the print to be carried to a cer-

tain depth of bronzing in the shadows without giving a heavy and uniform flatness. Secondly, the prints should be washed in several changes of soft water, and have a final wash in a weak solution of chloride of sodium previous to toning. Thirdly, after toning by any of the approved methods the prints should again be washed in three changes of water, the last being raised to 90° Fahr. Fourthly, fix the prints, by allowing them to remain for fifteen minutes in a solution of hyposulphite of soda (one pound to three pints of water) neutralised with powdered chalk or carbonate of soda. A slightly-acid reaction in the mixture will liberate free sulphur, which, I need not say, acts mischievously on the prints. The temperature of the fixing solution should also be raised to 90° or 100° Fahr.

The subsequent washing (which should not be a very long one, as such prolongation tends to create the germs of future putrefaction in the paper itself) should be a succession of frequent changes, the vessel being thoroughly drained before each renewal of washing, and the prints, when the vessel is filling, should be kept in a constant swirl motion by the force of a small ingress horizontal stream; and, last of all, the prints should be washed in *three changes of water at a temperature not less than* 100° *Fahr.* This final treatment is, in my opinion, the keystone of success, as it was proved by Sir John Herschel more than thirty years ago that the last traces of hyposulphite of soda *could not be removed from paper positives except by the application of warm water.*

I will just say, in conclusion, that all silver prints, so far as my experience goes, lose some little of their original *depth* during the *first three years* of their existence (and on that account printing should be carried rather on the side of excess); but, if treated carefully according to these directions, I believe we should in future hear no great outcry against the stability of silver prints.

USEFUL NOTES.

By J. J. Chidley (Broadford, Victoria).

How to Make a Swing Back to a 12 × 12 Camera at a Cost of 2s. 6d., if done by Yourself.

Take the sliding portion of the body and saw off a two-and-a-half inch section of that portion which carries the dark slide and screen. Strengthen it with corner-pieces of hoop iron or brass; then take the remaining portion of the sliding body and saw off the end nearest the casing screen to the angle required, as shown below, taking care that the centre of the angle is three and a half inches further from the bottom of the camera than the top, to allow room for the swing of the back. The two and a-half inch section is then suspended to the centre of the angle by the following, which serve the purpose of hinges:—Two pieces of stout hoop iron or brass three and a-half inches long, one inch broad, and one-eighth of an inch thick; punch and counter-sink three holes at equal distances; fasten them inside at the centre of the angle by two screws, allowing the third hole for a short bolt to carry the two and a-half inch section. The space between the angle and the section is rendered light-proof by the following:—Cut two strips of sheepskin leather large enough to cover the full angle, and back them carefully all round the inside to retain the swing back at any angle required. Take a piece

of stout hoop iron six inches long, punch a hole about half-an-inch from one end, and fasten it by a stout screw to the top outside end of the section. The remaining portion must have a quarter-inch slot about three and a-half inches long; a bolt with a hood-faced milled-edge nut fixed to the angular portion passes through the slot. By screwing the nut firmly down on any portion of the slot the requisite angle can be maintained. The angular portion should also be strengthened by corner-pieces of hoop iron or thick sheet brass.

How to Fit a Screw to Move the Sliding Body of a Quarter-Plate Camera at a Cost of One Shilling.

Buy at any ironmonger's a brass head shutter bolt about five inches long and half-an-inch thick, with brass nut and plate. Have a one-eighth inch hole drilled through the centre as near the head as will, by means of a pin, keep it in the plate, turning freely. Saw a slot in the bed of the camera sufficiently wide to allow the brass nut to move freely, four inches long. Fasten the bolt in this slot by two screws through the plate; cut off with a three-cornered file one-half of the nut and fasten it by the remaining hole to a small, square piece of wood, screwed down to the centre of the bottom part of the focussing-screen. The brass head of the bolt affords a ready means of moving the sliding body, and renders focussing more easy than by any other mode. I can speak from experience, having had this form of camera in use for many years.

To Reduce the Opacity of the Focussing Screen.

Warm the glass over a spirit lamp until quite hot, then take a piece of white wax and rub over the ground side, and, while hot, wipe all you can off it with a piece of clean cotton wool.

A Quick and, therefore, Economical Mode of Colouring Photographs.

For medallions, vignettes, and bust portraits generally first make a flesh wash, as follows:—Take a two-drachm, clean vial, and half fill it with clearly-filtered gum water. Fill nearly full with clear water; add to this two or three drops of Judson's scarlet dye, and to this must also be added a very small quantity of orange dye diluted with about two-thirds of gum water. Take one or two damaged cards, and try the flesh wash upon them, first going over the face with a brush moistened with the saliva. If too pink a little more orange can be added, but the exact tint required must be obtained before going any further. These two dyes in proper proportions will make a perfect flesh wash. Keep clear of dust by well corking when not in use. It will keep good for one or two weeks by using clearly-filtered gum water and distilled or good rain water. Having obtained a flesh wash to your satisfaction, proceed as follows:—Select a brush large enough to carry sufficient wash to fully cover the face, and have ready and quite handy a little carmine to which has been added sufficient of the wash to tone down the pink tint. Commence from the forehead and carry the wash evenly down, but leave a little extra on each cheek. Then quickly and before it has time time to dry take the tip of a small brush dipped in the carmine, and add to the wash in the centre of each heek. It can then be diffused evenly, so that it gradually mingles ith the tint. It requires some practice and care, but when properly

done the effect is equal to the best stippling. As the flesh wash is perfectly transparent, none of the delicate middle tints of the photograph are lost or blocked out. A little of the carmine can be put upon the under lip and a little colour to the eyes, if necessary, and the photograph is then no more defaced or its individuality destroyed than when it left the printer's hands. This cannot be said when the ordinary opaque colours are used. Almost all of Judson's dyes can be used for colouring dresses, carpets, &c., in photographs, when mixed as follows :—One-third dye, one-third gum water, and one-third distilled or rain water. Scarlet cannot be used by itself. The colours are best kept in two-drachm vials ready for use, but well corked. This system I have used for nine or ten years with the most satisfactory results.

Receipt for Photographic Colour for Stopping Out.

Burnt carmine and blue-black. For over-toned photographs a little Prussian blue, and the same colours for warm-tinted or under-toned prints, with the addition of a little burnt sienna.

A Safe and Expeditious Mode of Reducing Over-Printed Proofs.

After having toned and fixed the prints, taking care not to over-tone but rather under-tone of the two, immerse each print direct from the fixing bath into a dish of water containing the proportion of one drachm of the usual cyanide fixing bath to one quart of water. An old and almost exhausted cyanide bath is better than a new one. Place only one or two at a time, and watch closely. Directly they are sufficiently reduced place them back in the hypo. bath and move them about. A minute or so is sufficient, as the hypo. bath stops the action of the cyanide. A little experience is necessary. A better result is obtained when they take from one to two minutes to reduce. If the reducing bath be too strong the colour slightly changes, and more water must be added ; but when slowly done the tone should not become changed. Having used this mode for seven or eight years I can speak with confidence of its value.

Removing Small Black Spots from Finished Cards.

This can best be done by means of a finely-pointed needle, using a good magnifying glass.

The Best Use to Make of an Old Negative Bath.

This can be made into a good printing bath in the following manner :—Measure the quantity of bath, and add to every ten ounces from one to two drachms of nitrate of silver, one ounce of nitrate of ammonia, half-a-drachm of liquid ammonia, and half-an-ounce of methylated spirit. The bath having nitrate of baryta in it is of no disadvantage. It must not contain any acetic acid, but only nitric acid. Float three-quarters of a minute in summer and one minute in winter. It never discolours in use.

A Steel Punch for Cutting Albumenised Paper for Cartes de Visite or Cabinets, &c.

I have been using for some time past a square steel punch with round corners for cutting out albumenised paper. It can be used in any ordinary copying press, and fifty or sixty cut at one time. A section of a block of hard wood forms a good bed to punch upon.

Adding Intensity to any Portion of a Negative.

A little of Judson's orange dye, mixed with about two-thirds of gum water, can be used on either or both sides of the negative. Moistening the part with the saliva will render it more easy of application. The great advantage of its use is that, being perfectly transparent, it blocks out no detail.

Formula for a Quick Collodion.

Plain collodion ..	1 ounce.
Iodide of cadmium	$3\frac{1}{2}$ grains.
Bromide of potassium	$2\frac{1}{2}$,,

First add the cadmium to the plain collodion, shake up, and when dissolved grind the potassium to a fine powder; dissolve it in a few drops of distilled water, and add to the collodion. It will produce a white sediment, which will settle down in a few hours. It can be used immediately it becomes clear, and keeps well. Having used it for many years I can recommend it strongly for dull weather, strong contrasts, and instantaneous negatives.

A Simple and Efficient Door Spring for the Dark Room Door.

Procure two yards of common, round elastic, to be bought at any draper's shop, aud two small brass hooks. Screw one in the upper part of the inside of the door. The nearer the hinge the weaker the power. Make a loop at each end of the elastic, and use the full length It pulls the door slowly and continuously, and does not bang it, as strong springs and weights do. The other hook can be fastened opposite the door at the end of the dark room. If found not strong enough four yards can be used.

The Uses of a Portrait Lens.

I believe there are many photographers and amateurs who do not know the various ways they can use a good portrait lens. Although having been a photographer sixteen years I have never possessed a view lens of any kind, and yet have constantly taken views of various sizes and with fair average success. I have always used the front combination of my No. 1B Dallmeyer for any view up to whole-plate size, removing the back combination and putting the front in its place. The usual stops can be used, but No 6 is most preferable. The back combination will take a 10 × 8 view, but a cardboard stop blocked with a hole one-eighth of an inch in diameter must be used if good definition be required to the edges.

A SIMPLIFICATION AND IMPROVEMENT IN CARBON PRINTING FOR SMALL WORK.

By E. W. Foxlee.

It may appear somewhat paradoxical to speak of simplifying a process by adding another operation to it, yet in the present instance it is not really so. It has been said (and correctly, I think) that if the tissue be but successfully sensitised and dried the greater portion of the supposed difficulties in carbon printing are overcome, and that the prints may then be developed on almost any support without fear of en-

countering the evils of blisters, reticulation, washing out of the lights &c. But may be—either from want of care or judgment—this happy state of things is not always attained, and, I take it, any means that can be adopted to avoid the evil must be a simplification, provided the remedy be not too troublesome of application.

Another advantage, in addition to what I have mentioned, will accrue from employing what I am about to suggest, namely, that the prints will be of better quality in however good working condition the tissue may be. It is generally conceded that the most simple to work in carbon printing is the single transfer process, and next to that the development of the prints on Sawyer's flexible support. When the pictures are transferred from this they are equal in every respect to silver prints; but, unfortunately, in mounting they lose much of the gloss and transparency of the shadows, become somewhat dull and heavy, and therefore lack the brilliancy they formerly possessed. However, results nearly or quite equal to those developed on collodionised glass—when the full gloss is not required—can be obtained from flexible support and with much less trouble.

Now for the means. It is simply to coat the tissue after it is printed with plain collodion, and allow to dry before mounting on the flexible support for development. It is then treated in the usual way. The tissue may be easily coated in the following manner :—Provide a piece of smooth board a little larger than the largest-sized tissue that has to be coated, and in the back of it screw a knob to hold it by. On the front right-hand side stick a couple or three drawing pins, or, better, what are known as "drugget pins," so that the heads project a-quarter of an inch or so from the board. Now take the tissue and slightly bend up the edges in the form of a tray; then slip one side under the pins, leaving the bottom edge projecting slightly over the board, and put another pin on the opposite side. The tissue will now be held firm enough to prevent it slipping, and that is all which is required. The collodion (which should contain about six grains of moderately-tough cotton to the ounce) is then poured on, and drained off as in coating a glass plate. The print is then removed and pinned up to dry. When dry it is ready for mounting on the support. In mounting it is advisable not to soak it quite so long as is usually done, because the tissue will then expand, and so cause the collodion film (unless it be very elastic) to crack. In the development the prints should be allowed to soak in the warm water rather longer than usual before attempting to strip off the paper, owing to the shorter soaking the prints received prior to mounting, and, consequently, less water was then absorbed to soften the gelatine.

The advantages I claim for this method of working are that when the pictures are finished they have the surface and brilliancy, and the shadows have all the transparency, of silver prints, which brilliancy they retain after mounting. If the tissue be too soluble, so that in the ordinary way of working it would reticulate or blister or the high lights wash out, the collodion coating entirely prevents it. If the tissue from any cause should be tough or insoluble, the collodion appears to hold it firm to the support by preventing expansion, so that a prolonged development in hotter water may be used without the tissue leaving the support or blistering. The same remark applies in the case

of over-printed proofs. Also, after the pictures are dried, the prints are more easily detached from the support if that has been imperfectly waxed. All spots may be touched out while the picture is on the support, in the same way as is done with "chromotypes," so that the spotting being on the back of the print will be less conspicuous in the finished picture.

In conclusion: I must disclaim any originality in collodionising the tissue after printing, as that is an old "dodge," but, as applied to flexible support, I do think its advantages are not so well known as they deserve to be; hence the present suggestion for its employment.

HINTS TO LANTERNISTS.

By Henry Cooper.

During the past two years little change has occurred in the form of oil lanterns. The sciopticon and the triple-wick lantern remain the best forms of lantern for school purposes or for parlour amusement, though it is still doubtful if the best use is made of either of these excellent instruments by many who work with them.

Take the front lens, for instance. No doubt it is as good as can be expected for a reasonable price; but if anyone possessing one of these lanterns will take the trouble to replace the front lens with one of Ross's or Dallmeyer's No. 1 *carte* lenses a manifest improvement in the light will at once be seen; and if, in addition to this, an ounce of camphor be shaved up and dissolved in the paraffine oil before the lamp is filled, a still greater improvement in the light will be the reward for the trouble taken. It is surprising that the good old plan of adding camphor to the oil ever fell into disuse. Anyone possessing a pair of sciopticons can quickly test the value of this addition.

In a medium-sized school-room a six- or seven-foot picture may be made fully as brilliant as an average lime light on a twelve-foot disc. Camphor dissolves much more quickly in paraffine than in sperm oil.

TRANSPARENCIES.

By A. J. Simpson (New South Wales).

The all-absorbing topic of gelatine seems to have thrust aside—for the time, at anyrate—most of the old subjects upon which we were accustomed to get hints and notes. Amongst those which it has so displaced is that of lantern transparencies—perhaps only temporarily; for, when reading here at the Antipodes of the wonderful softness and detail usually obtained by workers with the new medium, I have often mentally exclaimed—"What exquisite lantern pictures such negatives should make!"

The conviction that many readers are interested in this topic not less than myself has induced me to pen a few lines—not, perhaps, to teach anything on the subject, but just to tell how and why I have been so much disappointed in the ordinary run of commercial slides procured from various makers in England. Before proceeding further, however, I may say that in all my purchases I have had to leave the selection of the slides to the dealer or manufacturer of them, suggesting only the

class of subject, the result being a great diversity of quality. Here, perhaps, some of my readers may exclaim—"It was not likely the manufacturers would resist the temptation to send such pictures as would be rejected by those of his customers who had the opportunity of selecting the more perfect ones—so getting rid of unsaleable stock, whither it was not likely to be returned; and that, therefore, my collection does not fairly represent the average run of pictures prepared for the lantern!" How far this may be true I cannot say; but I am convinced that numbers of the transparencies sent out have been produced from negatives prepared for painting on paper, and many, perhaps, taken years ago with imperfect definition and heavy shadows, showing an absence of detail.

Commencing with some French slides, made by Levy et Cie, Paris, the scenes being from India, Egypt, and other places: I take a sheet of opal glass or white cardboard, and, placing it at such an angle as to get a good reflected light, I examine one of the pictures and am delighted at the transparency of the shadows. If the subject be the ruins of an old temple having columns covered with inscriptions, every detail can be made out with the aid of a magnifying glass; even in the darkest parts of the picture (yet the lights have not been solarised or detail obliterated) all the gradations between the two extremes appear to be there. Every part of it can be seen through; and I am sure the scene, as projected upon the screen, will give extreme pleasure on account of its technical excellence.

Here is a slide by another maker—an English one. The subject is one of those delightfully-picturesque scenes with which the Rhine district abounds. At the first glance I feel a thrill of pleasure—I am fascinated with the wild beauty of the landscape. There are mountain, plain, and river—a strong, rugged foreground—well-defined middle and an infinite distance. How I would like to gaze on the actual scene itself! Suddenly I think "this will look pretty on the screen," and I begin to examine it more critically and in a new aspect. My pleasure gradually dies out. I feel disappointment gathering in my heart. Why? The picture will not bear inspection under this new light. The masses of shadows in the foreground—those rocks, and the foliage of the trees, which give vigour to the view when first looked at are, I find, all but impenetrable by the strongest light; even sunlight can scarcely pierce the density. Now, I look again and see there is little or no detail in them; they are inky black, and will look like large blots upon the screen. Again: the distance when examined more attentively is hazy and scarcely defined—in fact, would probably not be seen at all. Now I have nothing but the middle distance, and, looking at the more strongly-lighted portions, I find an absence of detail. How was this negative taken? Was it with an old, insensitive collodion? Or did it receive insufficient exposure? Or was it smeared so intensely before finishing that no light could penetrate its high lights and but little its half-tones? Or how was the slide made? Was it with a thick collodion on a wet plate developed with all the free silver clinging to it, and left to accumulate on the shadows while the lights were coming? I will not give an opinion; but I know how such an one can be made, and so, of course, dear reader, do you. But could not a better one have been made, even with a bad negative? I think so. Modifications of the collodion,

developer, mode of developing, and process might have been adopted which a little thought would suggest.

Now I take up a few Scotch views (would I had more such!). Here is a delightful picture for the lantern—such a view as that enthusiast, Professor Piazzi Smyth, would, I venture to say, be pleased with, and he is (I judge from his writings) critical on this subject. I could look at such a transparency again and again. But I note in the corner those well-known initials, "G. W. W." I hold it up to the light, and rapturously exclaim—"What a beautiful tone, too! Is it gold or mercury?—a splendid red-purple, rich and warm!" I go through numbers of other slides, but none do I find with this same warm tone. Why? Here are some more as technically excellent but colder in tone; but they bear the initials, "J. V.," and so I conclude such men as George Washington Wilson and James Valentine do not get their reputations without deserving them. I see a view taken with great rapidity—that is, for collodion. The result is a good deal of haziness amongst the moving figures. The whole of the pictures bearing the above initials are good, but I wonder why in all my collection I find *one* solitary picture with that particular tint which I admire so much. It has a shade resembling rose or pink madder, and, held before a flame, it tinges it with the same warm hue.

In the matter of mounting I am sure there should be inventive genius enough amongst the profession and collateral businesses to invent something more durable and impervious to moisture and dust than the thin paper bindings. Could no tough, elastic cement be made in which to dip the edge of the slide, either after having put the paper on or without paper at all? One of the makers of slides, I observe, pieces one of the two plates, and pastes a piece of paper over the small slip thus added to the $3\frac{1}{4} \times 3\frac{1}{4}$ inches, bringing it up to about four inches, to the detriment of the slide; for it affords another opening for damp, besides which the two edges of the glass grate against each other, especially if the whole piece should get cracked opposite this weak spot (a thing it is very liable to do), causing fine particles of glass to work in between the picture and its protecting plate, with a result that needs no telling. The masks are also too thin, allowing light glasses to get pressed into contact at times Many of the English slides are made upon unnecessarily-stout glass, so that they will not go into an ordinary plate-box, nor into the groove of the lantern carrier, which I have adopted, without tearing the binding paper. Surely the mounting of lantern transparencies leaves much room for improvement!

In making the pictures by the wet process it seems to me that the best results should be obtained by using a thin, structureless collodion, and washing off all free nitrate with a good flow of developer. The toning is also a subject which has been frequently treated of, and yet, judging by the majority of slides which I have seen, the cold, blue-black or inky colour is the one most frequently produced. I know one of your contributors (Mr. W. Brooks) experimented largely, and published the results; but I think it was chiefly, if not altogether, with a collodio-bromide emulsion (washed). What is wanted is some simple modification of the ordinary wet process which will ensure the proper colour in the metallic deposit forming the image. In my own collection there are three distinct tones (and various intermediate shades)—the

rich red purple, so rare but so attractive; the brown, such as Levy et Cie (Ferrier) manage to produce; and the cold, bluish-grey, like a much over-toned print on paper. The first and second both have admirers, the last none.

I hope some competent person who has much of this work to do or much leisure time may be induced to investigate and experiment—*pro bono publico.*

THE NECESSITY FOR PURE BROMIDES IN EMULSION WORK.

By L. PERROT DE CHAUMEUX (Paris).

EVERYONE who has tried emulsions has experienced, more especially with gelatine, great irregularity in their results. One day everything goes well, while the next a preparation made with equal care gives very bad results, and there is nothing but fog in the studio. The reason of this want of success has been variously attributed to the nature of the gelatine, to an excessive temperature, and to too prolonged emulsification.

All are possible, but there is another cause which does not attract attention, but which, I fear, deserves no less to be guarded against. I mean the impurity of the bromides employed. When they only contain an excess of water there is no great harm; but there are some which contain iodides, chlorides, carbonates, &c., which depend very much upon the amount of care bestowed upon their manufacture, and, unfortunately, all dealers are not chemists. They buy as cheaply as possible, and we are the sufferers.

I think it necessary to call attention to these impurities, as they often materially change the condition of the preparation of emulsion, and afford quite a series of studies—a long series for a single individual; but the number of amateurs is so great that, once attention is attracted to this matter, some light will soon be thrown upon it.

Instead of an article I have given a programme of research. Should the question be gone into and elucidated it will, perhaps, prove of greater utility than anything I could have written, and which, perhaps, your readers are better acquainted with than myself.

STOPPING OUT SKIES AND SIMPLE VIGNETTING GLASSES.

By W. CLEMENT WILLIAMS.

IT often happens that, from over-exposure or the opposite cause, the sky of a negative is too thin to print from, or is rendered useless owing to some imperfections present. To get over the difficulty resort is often had to painting out the sky altogether, or an attempt is made to paint clouds on the clear glass side of the negative; but, owing to the smooth surface, this operation at best gives but very unsatisfactory results. To meet the emergency make a sky negative to suit the special requirements of the case. This is accomplished as follows:—

The negative is placed on a retouching desk, on which also place a piece of ground glass of similar size, with the ground side outwards. With a lead pencil mark out roughly the outline of clouds to suit the

sky of the negative seen beneath. Having done this, commence to scribble in "the body colour"—as we will term it, for convenience—with the lead pencil, cross-hatching backwards and forwards. The rough surface of the glass takes the lead beautifully. With the tip of the finger rub lightly over the pencilling. This at once softens down all lines and leaves all perfectly graduated. Repeat the operation, darkening by again using the lead, and lightening by rubbing with the finger until the desired effect is attained. A cloud negative so produced has a fine grain like a crayon drawing. A piece of soft india-rubber may be used with advantage for the purpose of picking out the edges of clouds. I am not bringing this matter forward as an advocate for the use of artificial cloud effects, preferring the real thing where such can be obtained ; but for blocking out uneven skies, or for remedying the evils mentioned at the commencement of this communication, I can with the greatest confidence recommend the plan as the best I know of.

Vignetting Glasses.—To produce vignetting glasses of first-class quality it is only necessary to proceed in a similar manner to the above, rubbing the edges of the glass to a dark tint, and softening towards the centre. By using a bit of rag to wipe the finger from time to time when graduating, it is only necessary to continue rubbing to lighten any portion desired. Two or three of these glasses so prepared may be used to each negative with good effect, although one is amply sufficient for all ordinary cases. When vignetting portraits, cloud lines can be vignetted in the background by the above method. These glasses may be varnished in the usual way, last for a long time, and are quickly made. For use place them in the printing-frame, and then the negative to be printed from.

ENLARGED TRANSPARENT POSITIVES.

By Ellerslie Wallace, Jun. (Philadelphia).

It has long been an acknowledged fact that a transparent positive shows the beauties of a fine negative much better than any paper print, no matter how large. An enlarged transparent positive is a form of finished result which I believe to be capable of awakening fresh interest among those who have already printed and mounted their work in the usual way.

Let us look at the conditions required for a good result in this department of our well-loved art of sun drawing. First, and most important : a good subject properly lighted and a point of view well chosen. Second : the well-known qualities of all negatives destined for enlargement—that is, freedom from spots and blemishes, sharpness, full timing, and very moderate density. Third : careful focussing. In speaking of proper lighting of the subject, I do so with especial reference to the crisp effect producible on a negative film by an object so lighted as to appear prominent or even salient, no class of negatives, perhaps, being more unsuitable for enlargement than those having the peculiar flatness caused by working too much "with the light," so that the shadows become nearly or quite obliterated.

Before going further it would be well for me to say that, as these remarks are intended to apply particularly to outdoor work, it will not do to take all classes of such work indiscriminately. For instance :

while comparatively few *landscapes* make effective enlargements, a nice bit of foliage detail, or part or a whole of a highly-ornamented or quaint building, will be found to gain in interest and effectiveness *pari passu* with the rate of increase of size. The method of enlarging is simply to support the negative in front of a north blue sky or a south window covered with white tissue paper, and to point at it an enlarging camera mounted with a suitable lens and extra bellows or cone front, in case the original camera does not give length enough. The space between the negative and lens must be darkened, and I find that the easiest way to do this is to put the negative into a small camera in the place usually occupied by the ground glass, and remove the front panel so as to allow the lens of the enlarging camera to take any required position. Ingenious devices for extemporising an enlarging camera will be found in the photographic journals.

As the bath will also be of increased size a saving may be effected by coating the large glasses in an ordinary tray. Let the tray be large and deep enough to be raised three or four inches at one end and accumulate the silver solution in the other, leaving the upper part dry, so that the collodionised glass can be laid flat on the bottom without touching the solution. By quickly and steadily lowering the raised end the bath will spread with perfect evenness over the film, and the sensitising proceeds with greater rapidity than in an ordinary dipping bath. Nor is it the least of the advantages of this plan of silvering that the bath stays in good order for a very long time, owing to the rapid escape of the ether and alcohol from such a large surface of solution. The collodion should be ripe, and thin enough to spread well on the size of glass used.

A very efficient and economical developer may be made by adding a gelatine restrainer in place of acetic acid. Take one hundred grains of Nelson's gelatine, put on water enough to cover, and after swelling and heating add ten grains of caustic potash. Then boil until a slight flocculent precipitate forms. (This takes about ten minutes.) Finally, dilute to nine ounces with water, and add one ounce of acetic acid No. 8. Of this stock solution add from half-an-ounce to one ounce to every twenty ounces of a thirty-grain iron solution.

As the finished transparencies will probably be used as window ornaments care must be taken to choose a stable intensifier. Make up stock solutions as follows :—

No. 1

Bichloride of mercury	1 ounce.
Chloride of ammonium	1 ,,
Water	4 ounces.

No. 2.

Nitrate of silver	½ ounce.
Cyanide of potass., C.P.	½ ,,
Water	24 ounces.

Dissolve the silver and cyanide separately and mix, stirring well to redissolve the precipitate formed. After fixing and washing dilute *quant. suff.* of the mercury solution to a convenient working strength, apply to the film till bleached, and *wash well.* Then drain the plate closely, and apply the cyanide of silver in an even sweep. The transparency immediately takes a fine purple-black tone, and must be washed again without delay, otherwise the free cyanide will redissolve the

delicate purple image and necessitate the repetition of the whole process.

The strength must be carried past what appears to be the proper point, for the varnish lowers the tone considerably. This may, indeed, be obviated by giving the plate a final wash of gelatine, albumen, or gum water, and allowing it to dry on. Then the varnish will not affect it; but there is always a risk of the film cracking after the use of such contractile substances. Still, if they must be used, add a little glycerine to the gelatine or sugar to the gum; this modifies the extreme tension.

It is best to put the original negative in the camera with its film side away from the enlarging lens. This gives a transparent positive—reversed when looked at in the ordinary way; but when it comes to be mounted in its frame the film side is *turned in* towards the ground glass, thus bringing it right again, allowing its own wrong side to act as a protective covering, and doing away with the necessity for a third piece of plain glass to protect the film from injury.

The cyanide of silver solution must always contain a slight excess of free cyanide of potassium, otherwise a white deposit will be thrown down all over the plate, and turn red when exposed to the light. If this be observed apply a weak solution of plain cyanide of potassium, which will remove the deposit and weaken the image; then repeat the application of the mercury and silver as in the first instance.

TRANSPARENCIES.

By John Nicol, Ph.D.

The question as to whether transparencies of the highest degree of excellence can be made on gelatino-bromide plates has during the past two years been frequently asked. Six months ago I thought "No." Now I say "Yes," provided the operation is gone about in a right way. I say "a right way," as doubtless there are more than one which will give first-class results, but the following method is capable of giving pictures equal to the very best that have ever been produced by wet collodion or any other process:—

The emulsion may be made according to any of the well-known methods, but should be thinner to the extent of about a fourth, and for each twelve grains of bromide there should be one grain of iodide. The cooking or boiling should be limited so as to secure a somewhat low degree of sensitiveness. An addition of a few drops of saturated solution of chromic alum to each ounce is an advantage, although not absolutely necessary. Very careful filtering is essential, and may be easily and effectually done by squeezing through wash-leather. The glass should be very thin sheet and must be free from speck or flaw; and, as the plates improve by keeping, the amateur should make at each operation as many as he has the means of drying rapidly and thoroughly. Exposure by superposition must be altogether discarded and the camera alone employed; but there is no need for what is understood as a copying camera. If the negative be placed on an astragal of the window and supported in a position leaning inwards, and an ordinary camera resting on a board adjusted at such an angle that the focussing glass should be

in the same plane as the negative, nothing more will be required, it being, of course, understood that where the copy is to be the size of the original the camera must be capable of extension to twice the focal length of the lens employed. With such an arrangement, and with plates of the kind I use, I find, on fairly-good days and pointing to a northern sky, an average exposure of fifteen seconds gives excellent results.

Ferrous oxalate is, for this purpose, undoubtedly the best developer. One part of a saturated solution of iron protosulphate added to four parts of a saturated solution of neutral potassium oxalate is the best proportion, as, although its action is somewhat tedious, the result is beautifully brilliant. By a suitable exposure and properly-timed development transparencies may be produced of good colour and just sufficient density; but, after many experiments and frequent trials in the lantern, I know that a higher degree of excellence—in fact, am tempted to say "perfection"—may be obtained by the following modification:—Let the exposure and time of development be so adjusted (a few experiments will show how) as to give a rather thin image, but perfect in detail. Then, after fixing and thoroughly washing, immerse the plate in a saturated solution of mercury bichloride until well whitened. Wash again, and flood with a weak solution of ammonia. This, if properly managed, will give just the density required, and produce the rich warm black that has such a charming effect on the screen. Do not be afraid of the fading scare that induces some of our friends to fight shy of mercury. I have used it occasionally for many years, have some negatives that have faded after the treatment and more that have not, and know that such fading is simply a result of bungling.

ON THE PRESENT POSITION OF PHOTOGRAPHY IN ENGLAND.

By J. Macer Wright.

Is there any man living who can say precisely what the position of photography is in England today? Men gifted with the true genius of art have come and gone, have lent their influence and support, and have striven unremittingly to obtain for photography a proper status; and with what result? That it stands practically disregarded today, and is apparently no nearer national recognition than ever.

That a man to be a good photographer should be endowed with rather more than an average brain, should be fairly educated, should possess a certain knowledge of chemistry, and have undergone some art training, is admitted as a matter of course; that, having entered upon the practice of photography under these conditions, he should occupy the position of a butterman or a butcher is considered to be equally a matter of course; and yet he is not a tradesman nor a mechanic. Local lawyers and doctors—whose avocation may require no greater intelligence, and who in some cases have less culture—exclude him from the professional class, while society generally turns up its æsthetic nose and regards him simply as a shopkeeper.

Men who paint with the brush or carve with the chisel have no hesitancy in using the camera or its results to assist them in their

work; but they look upon the people who have given them this power as interlopers in the domain of art. It is an undisputed fact that several well-known painters practice photography for the assistance which it affords in reproducing nature; but how many of them would openly admit it?

Despite adverse circumstances and jealous obstructions photography has proved its usefulness in the art world, and beyond that it has lent its aid to nearly every branch of scientific investigation—to astronomy, anthropology, and ethnology; while its social influence has found its way into the poorest of our cottage homes, and has exercised everywhere a beneficent and civilising power.

Surely, then, it is time that photography should be nationally recognised, and that men who have laboured so long and so devotedly for its perfection should be able to obtain from a properly-chartered society a title which would honourably identify them with their art and give them a status which they deserve.

ON THE PREVENTION OF SMOKE.

By R. Crosthwaite.

I do not wish to take up the valuable space of your Almanac by going over things which have already been so ably discussed; and, as I have no novelty to communicate, perhaps you will accept a suggestion to those who have done so much for photography that they should apply some of their energies to the abatement of the smoke and fog nuisance so prevalent at this season of the year.

Although, perhaps, not directly connected with the science of photography, it still has a very great effect upon those who practise it, especially those who have to make their living by it. If some means could be found to prevent or lessen the smoke and fog it would be a great benefit to those who reside in large towns, especially in London.

Surely, if some of those who have made such successful researches in connection with photography were to turn their attention to this matter, we should, ere long, have a considerable amount of light thrown upon the subject, and I have no doubt a considerable abatement of the smoke and fog nuisance would be the result. I trust the New Year will bring success in this direction.

PHOTOGRAPHIC COPYRIGHT.

By C. Pearce.

When the subject of literary and pictorial copyright comes to be discussed by Parliament, photographic copyright must be made part of the question. This was fully recognised by the Copyright Amendment Bill, introduced in 1879 by Sir John Holker, Lord John Manners, and Viscount Sandon—a bill which, sharing the fate of many other "innocents," was strangled in its birth.

The points touched upon in this bill were three in number, and, on the whole, put the case fairly well both as regards the photographer and the public, though a little more explicitness would not have been amiss, while the provisions cannot be said to include all the complications which arise in practice.

In this bill the references to photography are as follow :—

I. "The copyright in a photograph shall endure for thirty years from the date of the publication and no longer."

II. "The copyright in a photograph shall belong to the proprietor of the negative from which the photograph is printed."

III. "When the photograph has been made on the order of any person for a valuable consideration the proprietor of a copyright shall not be entitled to sell, expose for sale, or exhibit any copy of the photograph without the consent of the person, and the person shall have the same right of preventing the selling, exposing for sale, or exhibition of any copy of the photograph, and, if the copyright is infringed, of taking proceedings in respect of the infringement as if he were proprietor of the copyright."

Clause I. is not of great importance, though I fail to see why any limit should be fixed to the possession of a photographic copyright. Clause II. is plain enough, but gives a power to the photographer which, I fancy, he would not care to claim. For instance : it is obvious that if this clause were to become law one photographer could prevent another photographer from copying a print made from a negative produced by the former. As the law now stands the negative is the property of the photographer, unless, of course, it is sold as well as the prints to the sitter ; but, according to Clause II. in this bill, he not only retains the copyright in the negative but the copyright also in the prints made from the negative. In the case of a reproduction of an engraving or a painting this retention of power over the prints is absolutely necessary; but in the case of an ordinary studio portrait it becomes an absurdity. There are not a few photographers who make a speciality of copying *cartes;* if such a provision became law their occupation would be gone. Enlargements, again, would be seriously interfered with, since, to be perfectly safe, the consent of the photographer who made the negative would have to be obtained, and if he were annoyed at the commission being given to someone else he might raise an objection, which the law would uphold. It is also obvious that this clause, as applied to sitters when taken in connection with Clause III., introduces an anomaly into the latter. The "valuable consideration" referred to in this clause may be taken to mean any price paid for a photograph, whether sixpence or a guinea. We are left in doubt whether the "photograph" here spoken of is the negative or the print; but, assuming it to be the former, we have the curious position of affairs presented by a person holding a copyright being himself unable to "copy, expose for sale, or exhibit" such copyright without the permission of the person (*i.e.*, the sitter) who gave him the order, yet quite able to prevent this person from "copying, exposing for sale, or exhibiting" his own portrait !—a dog-in-the-manger spirit which the framers of the bill surely did not contemplate.

It is evident from this confusion that when the matter comes up again for discussion the considerations involved in the copyright of a portrait from life and in the copyright of a reproduction should be kept carefully apart. It is only in accordance with common sense that a person who sits for a portrait should have some kind of control over the multiplication of copies. But how can he do so unless he holds the copyright of the negative ? It is true that, according to Clause III., he has a control over the photographer in regard to copies and to the exhibition of copies ; but, if so, why not vest the copyright of the negative

in the sitter? The fact of the negative being the property of the photographer should not interfere with the sitter possessing the copyright, and if this were made the rule a good deal of complication would be avoided. But, if this be admitted, it is clear that some modification would have to be introduced into Clause II., which says the copyright in a photograph shall belong to the proprietor of the negative. This is all the more necessary, because a skilful lawyer might argue that when the photographer made the photograph on the order of some person for a "valuable consideration" he charged for the print and not for the negative, and the "glorious uncertainty of the law" might stand him in good stead.

The question of photographic copyright is undoubtedly an important one; and, though the bill of Lord John Manners has been shelved, it may reappear when Parliament has more time to discuss home affairs. Hence it would be well if photographers bore its features in mind, if only for the sake of clearness and simplicity, in any future legislation on the subject.

AMATEUR PHOTOGRAPHY.

By A. A. Campbell Swinton.

Why is it that more advantage is not taken of photography as a delightful, scientific, and yet artistic pastime? When the art was first introduced amateurs were plentiful enough, and the work produced by them was good enough for those days; and yet now, when the manipulations and technical difficulties have been so greatly simplified by the discoveries and improvements of late years, why is it that amateur photographers bear so small a numerical proportion to their professional brethren? And what are the causes of the indifference with which the general public regard amateur photography?

When photography first became a possibility it at once became the scientific rage of the day, just as, a year or two ago, was the telephone. Everyone who dabbled at all in science at once took up the new discovery. It was a scientific novelty—an artistic wonder. It was said that Science had at last given her hand to Art. When Daguerre first demonstrated his process before the Institute of France, on the 10th of August, 1839, Paul Delaroche, an eminent French artist of the period, is said to have exclaimed—"Painting is dead from this day!" The enthusiasm was general. No one doubted but that in a few years, at most, photography in natural colours would become possible, and the whole artistic world thereby revolutionised. It was not, however, to be so, for the invariable reaction followed this over-enthusiasm. Photography as an art was found wanting; the pictures produced were small; defects in the subject of the photograph were exaggerated; the process was new and, as yet, imperfect; the apparatus rude and unsuitable; for amateurs the manipulations were laborious, uncertain, and dirty. It had been thought that by means of photography anyone would be able to produce artistic pictures. This idea was found to be very far from being a true one. As a profession photography existed, but as an amusement it seemed to be moribund.

In 1851, however, Mr. Scott Archer gave to the world his beautiful collodion negative process. Professional photography at once revived

and attained a position as a trade which it has never lost since. Amateur photography also revived to a great extent, but only again to sink to a level—if not quite, yet very nearly—as low as before. The collodion process was undoubtedly beautiful, and has produced, and still produces, many of the most lovely examples of photographic art. It was eminently suited for professional purposes, as may be seen by the immense struggle that the new gelatine process has found necessary to make in replacing it. For amateurs, however, it was not well suited. The preparation of the sensitive film was both messy and a great labour. A dark room or tent, together with a whole paraphernalia of baths and chemical solutions, had always to be at hand for the development of the image. Every operation—from the first cleaning of the bare glass plate to the final fixing of the negative—had to be performed within a few minutes of the actual taking of the picture.

Dry collodion plates, which ameliorated in some measure these evils, did, it is true, exist; but they were, at the same time, expensive, troublesome, and uncertain, while the long exposures they required rendered them quite inadmissible for many subjects. In short, the collodion process was not in any form really adapted for amateurs, and amateurs would not adapt themselves to its requirements. Some there were who had sufficient perseverance to master the details and working of wet-plate photography, but a large proportion of those who attempted to do so either failed or found that the "game was scarcely worth the candle."

During the last two or three years, however, a rival to collodion has stepped into the arena. Plates coated with an emulsion of gelatine and silver bromide—infinitely superior in point of sensitiveness to those prepared with either wet or dry collodion—are now articles of commerce, and may be bought everywhere for a few shillings per dozen. These plates are dry, are bought ready for exposure in the camera, and will keep for months (if not for years) without the slightest deterioration. Could anything be better suited for amateur photography? Nor is this all; for the advent of these dry gelatine plates has produced special cameras and sets of photographic apparatus for their use which, complete, only weigh a few pounds. With such light apparatus, it is true, only small negatives can be obtained; but if these latter be clear and well-defined they can afterwards be enlarged to any size. Cumbersome and fragile apparatus need, therefore, be no longer carried by the amateur photographer; and the tent, baths, or chemicals need not be dragged from place to place. The camera, lens, stand, and a supply of plates—in all weighing only a few pounds—are all that are requisite, development and all subsequent operations being put off till a convenient occasion presents itself. Even this is not necessary, as the exposed plates can be sent to a professional photographer, who for a small charge will develope, print, and finish the pictures.

In this shape photography recommends itself especially to the traveller and explorer. To the former it presents a ready means of bringing back with him faithful reproductions of all that he sees, which will be ever present to remind him of his travels. To the explorer, on the other hand, nothing could be more invaluable, as it furnishes him with an infallible means of bringing back with him from different countries absolutely true reproductions of all that he has discovered. It is but

lately Mr. Whymper placed copies of photographs that he had taken among the snowy peaks of the Andes before the Royal Geographical Society. That learned body might, perhaps, have found it somewhat difficult to give credence to the marvellous accounts that Mr. Whymper gave them, had it not been that he had brought back with him proofs which were unquestionable. The negatives which he had produced—with no small difficulty, we may be sure—at an elevation of 18,500 feet above the level of the sea were infallible proofs of the verity of their author's statements.

Photography was not also without its use in the Nares' Arctic Expedition, when a collection of most interesting views was obtained. Instances of this kind might be multiplied without end in order to prove the extreme utility of photography for the exploration of foreign countries.

To the ordinary private individual photography presents itself as a delightful pastime and recreation. There are many people who would give almost anything to be able to sketch or paint, but who are not able to do so simply because they have not been endowed by nature with the necessary talents, and for these photography is admirably suited. What can be more delightful than to be able to produce mementoes of all the beautiful landscapes and edifices that one has seen—not to speak of portraits? Not only is it a source of pleasure to the amateur himself but also to all his friends, who thereby enrich their albums and enlarge their photographic collections. It might, perhaps, be argued that it would be much easier to purchase photographs of the objects wanted from professional photographers; but this is often quite impossible, amateurs having access in many cases to spots from which professionals are debarred. Moreover, the pleasure of possessing a photograph is greatly enhanced when it is one's own work or the production of a friend. Nor is this all. The very fact of being in search of objects for his camera often induces an amateur to make expeditions that he would not otherwise have undertaken, and thereby to penetrate into nooks and remote country places the loveliness of which he would not otherwise have beheld. Wherever he may be he need never lack subjects for his pictures. The wonderful sensitiveness of the gelatine film is impressed with equal ease by any object. Comfortable homes, tottering ruins, hoary forests, rippling waters, and roaring waves—all can be reproduced and preserved as a "joy for ever" by the amateur photographer.

ON PLATINOTYPE PRINTING.

By William Cobb.

What! another short paper on gelatine plates for the Almanac? Oh! please, Mr. Editor, don't be too exacting. It strikes me that fiddling so long upon one string, however harmonious at first, may become like "sweet bells jangling out of tune, and harsh." Besides, having had so much to do with gelatine emulsions, I am beginning to think seriously that, as like begets like, my brain has acquired the faculty of setting like such emulsions, and so refuse to flow with the necessary ideas. Recognising this as a possible fact, I think it is high time to strike another chord, and if I can succeed in making it reverberate to some good

purpose I shall feel inclined to dance with joy to music of my own making.

Gelatine emulsions and plates have had a very large share of attention given to them for a long time past. Doubtless deservedly so, considering the very important part which they now play in our system; but there is another element in the photographic economy which, recognising its bearing upon our future prospects, is, in my humble opinion, of sufficient importance to warrant us in giving to it a greater amount of attention than we have hitherto done. I refer to our method of printing. There is quite as much necessity for a revolution there as ever existed in the negative department. Is not that a positive fact? There may be—indeed, I will admit that there is—a great charm and richness about a well-toned silver print, and so there is about the rich autumnal tints of nature, or the silver grey of the luxuriant appendages which the sinner, Man, is sometimes vain enough to pride himself so much upon; but I must confess that all these have more or less a depressing influence upon my mind, for—

> "Tho' rich and charming in their way—
> They bear the impress of decay."

Regarding all this as inevitable, there is yet no reason whatever why we should not put a check on it where we can; in fact, as a rule we do. Then let us set to work to secure more permanent prints from our negatives, especially as existing means for doing so are now so ample and easy. I think it is a great pity that the public do not more frequently ring in our hearing the doleful cry—

> "These shadows, how fleeting! how soon they fly!
> They pleasantly greet us, then bid us good bye.
> Our turn will come next—we'll stop the supply!"

Ah! that would do it! If they only laid a finger upon our bread and butter we should see the necessity for immediate action and treat them more fairly in this matter. I am much pleased to find that there is a growing feeling on the part of the public generally in favour of platinotype printing, and it seems to me that if there could be more concerted action amongst photographers it might be made a popular method of perpetuating our productions. It is something new to them, and there is always a charm in novelty, apart even from its intrinsic value. It is worthy of note that the Platinotype Company have very recently adopted a much more liberal policy than formerly characterised their proceedings. This, if I mistake not, will prove a benefit alike to themselves, to photographers, and to the public; and I would very strongly urge upon the members of our fraternity who have not already done so the desirability of giving the process a fair trial, and introducing it to their customers. The working details are very simple and interesting, and the proofs themselves are stated upon the highest authority to be unquestionably permanent.

The only difficulty I have found in working this method is that of keeping the paper absolutely dry, which, in order to secure the best possible results, is of vital importance. In support of this fact allow me to state that, only a short time since, I had occasion to make a large print from a very intense negative. After taking, as I thought, all necessary precautions against the influence of damp, I placed the printing-frame containing the negative and paper in the open air to

print. Result: No. 1 was a poor, weak, muddy-looking proof. Knowing the paper to have been in perfect working order only a day or two before, and the atmosphere being as free from humidity as could reasonably be expected at the season of the year, I was puzzled, and made a second attempt under similar circumstances, but with a similar result. I then took the printing-frame, negatives, and pads, thoroughly warmed them before the fire, and tried a third time, making the exposure in an apart ment heated with hot air. The result proved all I could wish. There, then, was a case where, if the conditions of success had not been in a measure understood, the process itself might have been put down as the delinquent.

There is every reason to suppose that many of the failures which have arisen in working this beautiful process are directly traceable to the same cause. I would jnst add that, as a medium for working upon, the paper as prepared lends itself most admirably to all the requirements of the artist, whether it be for colour or black and white.

A HINT TO OUT-DOOR WORKERS.

By J. W. Reffitt.

The annexed is an arrangement which I have found useful in preventing loss of one or more of a set of stops, besides being handy for the changing of them when working.

The stops are made to open like a lady's fan—by fixing a stud or rivet through the upper part of them. [See A, *fig.* 1.] This stud

FIG. 1.

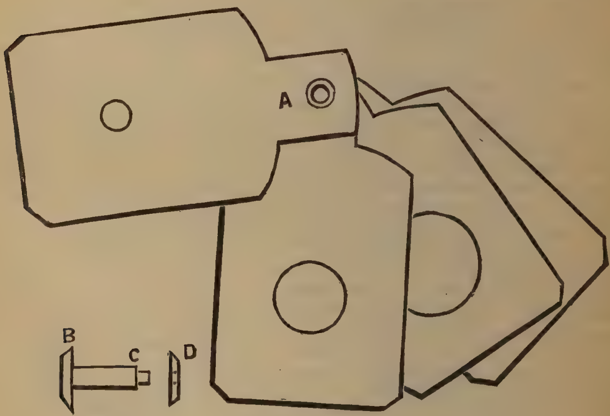


FIG. 2.

should be turned from a piece of brass to the shape in *fig.* 2. The length B to C should be rather more than the thickness of the set of stops, so as to allow any stop to swing sideways easily. D is a washer fitting at C, which must be fastened by rivetting.

HYPOSULPHITE IN THE OXALATE DEVELOPER.

By J. J. Dickinson.

It has been remarked (by Captain Abney, I believe) that a large quantity of strong hypo. added to the oxalate developer at a certain stage of development causes a complete, and very often an imperfect, reversal of the image. I have been experimenting in this direction lately with commercial plates, and I developed with oxalate. When development was about three-quarters through I added about two drachms of strong hypo., and got an almost perfect transparent positive.

I have also tried mixing the developer and hypo. first and then applying it to the plate, and have in most cases got a negative of a brown colour greatly resembling a pyro.-developed negative.

When using the pyro. developer I much prefer to take the pyro. straight from the bottle, and not use it in spirit and glycerine.

SOMETHING MORE, AND SOMETHING BETTER.

By W. Harding Warner.

In the beginning of the year just passing I put forth the assertion that "gelatine plates and platinum printing were made for each other." This was mooted by the Platinotype Company and others in the pages of The British Journal of Photography, the conclusion arrived at being that the results from gelatine were not in all cases suited to the process, from their thinness, poorness of quality, and want of body, so far as their experience went. The assertion I made was in consequence of my having seen both the negatives and prints of some of the best dry-plate workers, which were beautiful, and thus from my point of view I was correct.

Still the question remained whether it were not possible for the generality of those using dry plates, both for portraiture and landscape, *always* to obtain something more and something better than had been taken hitherto, so as to remove the slur cast upon such; for, after all, it is the artist and not the plate that is to blame in many cases.

If we compare wet plates and the conditions necessary to obtain the best results with them, we find we succeed just in the proportion that we follow such conditions. With collodion we need to have bright sunshine to make a shadow in our landscapes or architectural views, with a body of light to give force to the same, as well as a suitable arrangement of colours, especially in portraits.

With gelatine, however, the bright sunshine is, in most cases, destructive to the working of the plate (I am not here alluding to instantaneous pictures), and yet shadow is needed with a body of light to give the detail, finer pictures being obtained on what may be termed "cloudy or dull days." Does not this in itself suggest the remedy, pointing out that where the power of collodion ends that of gelatine begins?

Thus, very early morning mists, half veiling the mountain-top or wooded hill, or the ship lazily flapping her sails wet with the night dew against the masts, when all reflections and shadows on the glassy surface of the lake are most distinct, yet most unsuitable, from want of light and cold, for wet plates; these are the very kind of subjects the

"dry" loves to depict, giving most exquisite results. Or, in the summer evening, when Old Sol dips low on the horizon, giving forth his rosy hue o'er moor and fen, or tipping the hills with gold; 'tis then the dry plate revels and becomes the companion and sister to collodion.

Why should we not strive to imitate in and from real life some of those grand aërial effects of Turner or David Cox and other great masters of landscape that have passed away, and so elevate the minds of the people and our own position as artists? Is it that, up to now, we have lacked the thought and power of conception to do such? or is it from want of inclination or the too great love of things belonging to this lower world? If so, cast them aside in the future and put in force the power that gelatine gives, enabling us to obtain results with sufficient force and body in colour of film to print even in platinum, and thus gain most artistic studies.

To a thoughtful mind, time of day and season have everything to do with the making of good pictures, both in composition, lighting, and manipulation, be they from rapid or slow plates, though I have hitherto obtained the best results in landscape and interiors without halation from the latter. The portraitist who uses "dry" will find that if the south end of the studio be roofed with ground glass that the true light given forth from the object itself furnishes finer, better, purer, and more beautiful results than can be obtained in the present plain glass structures.

Let us hope that these suggestions may assist many in the improvement of their negatives and results by whatever printing process they may employ, and thus prove to each and every one—

A HAPPY NEW YEAR.

TO NON-PHOTOGRAPHERS.

By W. ADCOCK.

I WOULD have what I write read by those who have never taken a photograph; but as this in a book so professional as THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC is unlikely to occur, except in isolated cases, I hope those who are its readers will repeat the hint I throw out.

There are many persons of good means who want an occupation. For the same reasons that so many hunt, shoot, play cricket, follow carpentering and turning do I recommend to those who seek a pleasurable "fad" the practice of photography. Not only is the delight of getting good pictures great, but the means of attaining to this are now so simple and so multiplied that I cannot conceive any pursuit has greater claims upon the man with leisure at will than that of working to become a skilful amateur photographer.

Certain things are essential to success. These consist mainly of lens and camera by the very best makers—not bought second-hand, but new—a fairly well-fitted dark room, and good commercial dry plates. In buying an only lens I recommend as the most useful a Ross's symmetrical or a Dallmeyer's rapid rectilinear, and think, although nothing larger than half-plates are best for a start, those instruments should be large enough to compass a 12 × 10 landscape, when time and practice

have given skill to work it. With dry plates fine portraits can be taken in an ordinary sitting room.

I ask no more space for detail. I find photographers the most unreserved and communicative people living, and anyone will give an inquirer advice. Current photographic literature in the same direction is most ample and profuse.

ON PRINTING "VIGNETTE PORTRAITS" WITH A TINTED GROUND, LEAVING THE FACE AND HIGH LIGHTS WHITE.

By "F. S. K."

As I do not remember having seen any photographs printed in this style at the annual exhibition or elsewhere, I thought the following description of the method of producing them might, perhaps, be accepted as my contribution to the ALMANAC for 1882.

The method is simple, and is as follows:—Print a soft, shaded vignette on paper of sufficient size to leave a good margin. Negatives taken with a light background give, I think, the more pleasing results.

When sufficiently printed, place the picture face downwards on a sheet of glass, and, holding the glass against a light (that from a window will answer if not too bright), with a sharp-pointed pencil outline lightly on the back of the print the face, collar, and such other parts as are intended to have a white ground.

Fill in the spaces thus outlined with a strong coating of some good *non-actinic* colour, and allow to dry, or the parts may be masked in any other way the operator may wish.

When the parts to be protected from light have been properly covered, place the print face upwards on the glass of the printing-frame, and expose the back of it to the light. Examine the print at intervals to see the progress of the tinting, and, when it is considered to be sufficiently deep to give the desired effect, remove the print from the frame, and place it face down in water. Wash off the colour; then wash, tone, fix, and finally wash as usual.

The result will have a pleasing effect, the ground of the protected parts being white, whilst that of the rest of the picture is tinted.

NOTES.

By J. BARKER.

ALWAYS use hard water to wash gelatine emulsion; or, if nothing but soft water can be obtained, add a few grains of Epsom salts and common table salt to each gallon of water.

Do not use a large excess of haloid salt in making gelatine emulsion; in fact, the nearer the equivalents are arrived at the better, provided the washing be done with hard water.

Do not break the gelatine up too small when washing it, as, if a gelatine emulsion be washed by pressing through the meshes of a fine net, it will be rather prone to frilling; whilst the same gelatine simply cut up into pieces and so washed will be entirely free from this nuisance.

Have as much non-actinic light in the developing room as possible. It is a mistake to have a small window and grope about in the dark. There is not the necessity for excluding every small ray of white light from a room flooded with non-actinic light that there is in a room with but a small window, as the yellow and red neutralise any stray ray of white light that may gain admittance.

It is a great preventive of frilling to use gum ammoniacum with the gelatine, and it is also advantageous in other ways. This requires, however, to be added in dilute alcoholic solution and intimately mixed. Running through the filter two or three times will be found an effectual means of incorporating the gum with the gelatine.

OWN TRANSPARENCIES FOR ENLARGEMENT.

By W. T. Wilkinson.

A fashion is growing amongst photographers of sending gelatino-bromide transparencies from which to produce carbon enlargements instead of the original negatives—a fashion against which much cannot be said if due care and attention be paid to getting a really perfect result; but if this result be not attained disappointment is sure to ensue.

The principal defects in most gelatino-bromide transparencies is want of proper detail in the high lights, and also want of contrast—as much from stained shadows from pyrogallic development as from any lack of density.

All photographers who from any cause prefer sending transparencies instead of the original negative, will get far better results by developing the image upon gelatino-bromide plates by means of the ferrous oxalate development than by pyrogallic; but they should bear in mind that transparencies for enlargements must be full of detail in both high lights and shadows, and must also possess the requisite contrast and density to ensure the enlarged negative being made brilliant and vigorous. These conditions are much more easily attained by ferrous oxalate development than by pyrogallic, when full exposure is given and judgment used in stopping the action when the maximum density is attained.

ON THE DISPLAY OF PHOTOGRAPHIC PICTURES.

By Thomas J. Pearsall, F.C.S.

The general effect of the exhibition of 1881 was of a quiet, pleasing character. Before looking at any single picture the visitor was impressed with the appearance of the room. Nothing obtruded itself, There were no startling margins of mounts, no vivid colours, no unusual framing, or fanciful combinations of mounts and framing. There was sufficient repose, and the collection looked well.

There have been occasions when the loud colours and disproportioned mounts and frames have raised the question as to proper displays of photographic pictures; and, while the photographic press have at various times called attention to the apparent disregard of standards of taste, the general body of exhibitors have shown consideration and improvement in their selection of means to display their exhibits.

It is probable that other exhibitions may have also impressed photographers where the promoters distinctly made known that the very *reception* of a subject, in the first instance, depended upon uniformity of spaces and the margins of frames, no picture being admissible but those which followed the prescribed margins, materials, mounts, and frames. The recent exhibition in Pall Mall had an elegant, uniform, and tasteful appearance, unbroken by massive frames and enlargements of some subjects.

At a recent meeting of the Photographic Club the subject of mounts and margins was discussed. A written question had been submitted, viz. :—"What is the best colour for the mount of a photograph, the print being warm in tone?" The question might have been stated with more particulars. The speakers considered that a *warm* print should have a *warm*-tinted mount, and that a *cold* print should have a *cold*-tinted mount. In all cases, however, no mount should be lighter than the highest light of the picture. This at once raised the question of the general use of white mounts. Pure white, it was agreed, should be avoided. It was urged that the picture subject was the important object, and that everything else should be subordinate, while it should not be allowed to be depressed by surrounding it with purest white. In the absence of a true nomenclature for whites and light tints and for degrees of whiteness, the white sought for mounting a work of art should, as the French say, be a "degraded" white—a dirty white, in fact, the tone of white to be guided by the colour of the photograph. A dirty white, then, is to be preferred to the purest white. Cream colour is unsuitable; the tints of primrose, yellow, cream, and buff, by quantity and extent of surface of the mounts, often completely overpower the picture. Instances were quoted where *black* had been effectually employed; gold often has damaging effects. Besides, considering its harmony with the subject, gold often shows the cutting effects of certain lines and partial forms dependent upon the brilliancy of the gold at certain angles, which withdraws attention from the picture subject. If brown, roan, or olive green be employed, then of the tint selected none should be so light as the lightest tint of the photographs, nor so dark as the darkest shades of the picture.

The stationers, mount-makers, and picture-framers may have their attention called to this subject, while the photographers and friends to art may continue to be well exercised as to the best and most tasteful surroundings for the future display of photographic pictures.

PHOTOGRAPHY ON BOARD A STEAMER.

By G. L. Addenbrooke.

I had last April to make a voyage to the East, and, wishing not entirely to neglect the opportunity, took with me a few dozen gelatine plates. Perhaps it may prove worth while if I offer some observations deduced from my experiences of photography on board ship and in very hot weather.

A half-plate apparatus is, on the whole, much the best, as the resulting pictures are of a handy size, and, if average care have been taken in focussing, may easily be enlarged considerably without loss of definition.

The camera ought to draw out at least twelve inches, and a single landscape lens of this focus should be provided. Such a lens will give intelligible pictures of many fine coast scenes that with a shorter one would be mere lines. I would also recommend a six-inch portable symmetrical. Be careful to keep sea air from the lenses, as it soon destroys the polish and spoils definition. A good large hood and focussing-cloth in one, of mackintosh, should be made to slip over the camera, leaving only a hole for the lens. This will be found a great convenience when there is a breeze, and it protects the camera from both sun and wet. Each slide should have a mackintosh bag of double cloth, the rubber inside, made to fit it neatly, with a flap to turn over and button. Unless plates are efficiently protected—the dark slide itself not being sufficient—the sea air soon causes insensitive specks.

If a gelatine worker take the plates of the maker you know best, but also a box of collodion plates, the latter may save much annoyance, and one should always be used as a duplicate on important occasions. Plates should be kept in their original boxes, each wrapped round with brown paper, and the whole stock put in another box with a tight-fitting lid. The mind may then be at rest on the score of preservation. No plate-boxes need be taken. When negatives are finished they can be returned to the box from whence the plates came, and be put below any unused ones. This saves space, which is a desideratum.

For operating, a thoroughly-good, strong ruby lamp is most desirable. It should burn a candle or night-light, oil being very disagreeable. The ports should be shut some time before changing plates—it does not matter for development—if the cabin be on the lee side of the ship, to allow the fine spray suspended in the air to settle as much as possible. Lay everything out in order, wash the hands to free them from salt, and then change the plates rapidly, glancing carefully at each to see that there are no defects in the film, otherwise a bubble or bit of dirt may spoil a good negative, which there is no chance of retaking.

Exposures are very rapid. Using my own instantaneous shutter, described in last year's ALMANAC, which admitted light for about *one*-sixth of a *second*, the third stop of Ross's symmetrical was sufficient in the Mediterranean and Red Sea for well-lighted and fairly-distant subjects.

Development should not be delayed more than a few days. It is almost impossible to avoid a few insensitive spots in the plates, and these spread considerably in time, causing circular, transparent patches after fixing.

Everything should be prepared beforehand for as rapid a development as possible. All dishes are best of *papier maché*, except one of china. If the temperature of the air and water be under 75° Fahr. no particular precautions are necessary; but if it be above that point ice must be used, and a good lump kept in the developer. The following is then an almost priceless bit of apparatus, and may be easily made:—Take an ordinary tin, cone-shaped coffee pot with a spout and handle; cut two thick layers of wadding to cover the whole body and bottom. Glue on lightly and then sew over a piece of mackintosh, stretching a strong rubber band round the top to prevent water reaching the wadding. In this water may be kept cool a considerable time, when in an ordinary jug it becomes hot and useless in a few minutes.

Whenever the shade temperature is above 80° Fahr. it is best not to fix; but, while the plate is being washed after development, put a three-ounce bottle of methylated spirit in the iced water, and when the plate is sufficiently cleansed put it in the china dish and pour this over. The plate should remain well covered about fifteen minutes, or until every sign of greasiness has disappeared. Then pour the used methylated spirit into a stock bottle—to be used as a first application again—and flow a little fresh over the plate. It may now be set up to dry and will be completely desiccated in about half-an-hour, when it should be stored away out of the light until a favourable opportunity occurs for fixing. The plates, so far as my experience goes, will keep an unlimited time in this condition. The use of spirit will be found an incalculable advantage. One can develope well with a quart of water, and the plates are ready to put away in one instead of often twenty-four hours. Besides, even fixed plates cannot be improved by finally drying in salt air. Put two stout rubber rings round each solution bottle.

A word of warning: avoid as much as possible taking portraits on board. They are seldom good and cannot be printed off-hand. To please everyone will exhaust half your stock of plates, and to make exceptions is sure to cause ill feeling, people who have nothing to do becoming touchy on such small points.

I have written this *olla podrida* trusting it may benefit some of the many amateurs who must make sea voyages and desire to bring reminiscences other than purchased photographs home with them, and not for the delectation of X Y Z professional photographers, who go out with one settled object, and probably know a great deal more about the subject than I do.

A CHAT UPON OPAL GLASS.

By G. Watmough Webster.

As I suppose about nineteen out of every twenty articles in the Almanac will be devoted to dry-plate work, I take it the Editor will welcome any subject running in other grooves; and hence I have thought a chat upon some of the properties of opal glass will not be unacceptable, the production of pictures upon this medium having of late years far exceeded anything it had previously attained, and there does not seem to be any falling off in the demand. It lends itself to great variety of treatment—from the plain untouched portrait to pictures of the highest finish. Though to some extent this fact may explain the great demand, in the main it is probably the peculiar and delicate effect that opal gives to good photographs when taken upon it that causes this medium to become such a favourite.

It is, perhaps, scarcely necessary to call attention to the two kinds of opal glass—flashed and pot metal—though there is more real difference between them than is often supposed, the pot metal giving an effect far more akin to porcelain than its cheaper substitute. A kind of opal that rarely now appears to be used was the cream-tinted, designed to suggest the effect of ivory. Some very beautiful effects with it were exhibited when it was first brought out, but it scarcely ever appears to be used at present.

Then, again, there is both the bright-surfaced glass and the roughened (by a strange trade usage, technically termed "smoothed"), the effect on the latter being much more artistic. *En passant*, I may say that it is also for carbon work much more easily managed by the tyro. Some of the most costly-painted photographs are, however, done upon the plain glass, which is, however, treated in a peculiar manner—varnished, in fact, with a special matt varnish, that combines with the advantage of the "dead" surface a faint tint, which helps to destroy that crudity of tone which the absolute white of good opal is apt to engender.

Let me here give a word of warning to all who keep large quantities of opal in stock:—If it be not carefully preserved from the atmosphere it will become stained in a way that no ordinary cleaning can remove. In all probability, through the glass offering such a large surface, the lead entering into its composition in the presence of atmospheric moisture is acted upon by the sulphur that exists in the atmosphere of all towns. It is quite sufficient to pack the glasses in parcels (the glasses touching one another) to preserve their whiteness, though the glass must ultimately give way in colour when the pictures are framed if they are not made almost air-tight in pasting in. When this stain does make its appearance on an unused piece of glass, rubbing with strong nitric acid will remove it.

With regard to the finished picture, especially when a painted one: I may say that most photographers adopt the plan of backing it up with a piece of orange or red paper—a method which certainly produces a marked alteration in the effect, and one that I think decidedly advantageous; yet this effect is quite different from that given by the cream-coloured glass, as also from that obtained by varnishing upon bright glass. It, however, saves time and trouble—very important points with some workers.

I have found pot metal opal much more difficult to cut with a diamond than ordinary sheet glass; and, having once had a costly experience of the risk, I would advise my brother photographers—whose experience of opal is not so great as to render my advice superfluous—always, where possible, to ascertain the kind of frame the picture is to be placed in, and, beyond that, if it can be done, to fit the opal before being painted or even printed; for there are now used so many light and fragile fancy frames and mounts with oval apertures, having no provision for the glass beyond a margin of perhaps a-quarter of an inch larger than the "sight" itself, that it is next to impossible always to ensure cutting and fitting with safety.

The cleaning of this glass is always a bugbear and, to the photographer with many assistants, a loss, as so many plates get destroyed rather than that the trouble of cleaning should be undergone. For rejected opals where a collodion process has been used I recommend the employment of strong nitric acid; it will take the film off, and have a tendency to remove discolouration. If, however, the picture is in carbon an acid bath will not always remove all traces, as it sometimes appears to embed itself in the pores, leaving a distinct image visible, especially when it has been long dried on to the plate. For such cases a solution of caustic soda (about two ounces to a quart) forms an irresistible renovator, every trace of picture being easily removed after a short immersion or rubbing.

I will conclude by a caution not to use this renovator too strong; for, if it be so used or for too long a time, it will destroy the delicately-deadened surface of the glass, leaving it in a state of semi-gloss.

AMATEUR PHOTOGRAPHY.

By Herbert S. Starnes.

Amateur photographers may be divided into two classes. There are, first, those who, having no business to claim their attention, can give the whole of their time and energies to photography; and it is to these men that the best thanks of photographers are due for their expenditure of time and money in experiments, &c., which they publish for the benefit of others less fortunately situated. But there is also a very numerous class of amateurs—men of business, &c.—who have their evenings disengaged, but who can only spare a day now and then for their favourite hobby. All such I would advise to work only small plates, because what is required is seldom more than a memento of places visited, and generally only one or two prints are required from a negative.

To spoil many large plates at eighteen shillings per dozen makes photography an expensive luxury, and is the reason for many giving it up in disgust; but the question is altered altogether if one makes one's own dry plates. Then, whether large or small plates are used, photography becomes one of the cheapest of pastimes. Quarter plates can be coated at threepence to fourpence per dozen, and 10 × 8 plates at about one penny each. As most amateurs have plenty of spoiled plates on hand they do not require to buy glass, so that one may say that half-a-gross of plates can be coated for less than the makers charge for a dozen.

Until I saw last year's Almanac I thought dry-plate making was one of the most difficult things possible; but, after reading the articles by Dr. Mantell and others on the subject, I decided to try, and I have got on very much better than I expected. I must here thank Dr. Mantell for his kindness in publishing his excellent formula. I made two slight modifications, viz., by using half of Nelson's No. 1 gelatine and half of Coignet's "gold medal." When making the first lot of emulsion, as I had no bitter ale in the house and was afraid of the quality of public-house ale, I did not use any; and as I got plenty of density without it I have used none since.

As to the quality of these plates: I have bought plates of several makers; have exposed on the same subject—first one of these, then one made from Dr. Mantell's formula (allowing from fifty to 100 per cent. longer exposure for the latter); have developed according to their directions, and then used the formula for the home-made plates; and in every case I was by far the most successful with the latter, especially in the gradations of tone from light to dark. I do not say they were perfect, for there were air-bubbles and specks of dust on some of them. I also had a difficulty in drying them, as I had not a proper drying-box; still there was nothing but what I think I shall be able to avoid in future. I am convinced that Dr. Mantell's formula is all right.

With the bought plates, unless the exposure was exactly right, I could not get a proper gradation of tones, but with the others it is

different. With the latter I exposed four plates—one each for two, four, six, and eight seconds' exposure on the same subject, and after development I could not tell "which was which." Of course, I added pyro. or ammonia as required while the plate was developing. The only explanation I can suggest of the reason why bought plates have this fault of flatness is that, on account of the cost of nitrate of silver, the makers use as little bromide of silver as possible in the film, so that, if the plate be at all over-exposed, long before the picture is fully developed in the parts of the plate where the light has been most intense the whole of the atoms of bromide of silver in the film have been reduced, and by the time the development is complete the deposit of metallic silver in the half-tints is as dense as in the high lights; and, through there being no more bromide of silver for the latter to reduce, the flatness of tints so much complained of with dry ptates is produced. I cannot think of any other explanation, as I found that home-made plates were much more like wet plates as regards gradation of tones.

Therefore, I would advise all amateurs who have their evenings disengaged to make their own plates. The cost of the first experiments will soon be repaid by the small cost of coating the plates afterwards.

NOTES FROM PRACTICE.

By W. H. Hutton.

I venture to send the following hasty notes—not as anything new, but in the hope that others may possibly benefit thereby.

During the summer I had some dry plates to develope for an amateur, and found all the images fogged, evidently by light. Knowing the dark room was safe, I questioned the somewhat disgusted beginner as to how he changed his plates, whether his camera was in good order, did light get into his slides, and so on. All seemed correct except the results; so, being somewhat puzzled, I asked to see his apparatus. Then the "murder was out." He was using double slides, the plates being, as usual, back to back, *but there was nothing between them;* consequently, when he exposed one the light passed through to the back of the other. I advised a few thicknesses of non-actinic paper, and subsequent negatives showed no trace of fog.

With regard to the yellow stain on negatives developed with pyro.: I have found that using distilled water does away with it to a great extent. Some tap waters contain a large quantity of air, and, on pyro. being added, discolour immediately; while distilled water, similarly treated, remains colourless for some time. Since using it I have been little troubled with yellow stain.

Cadett's pneumatic shutter is a very useful instrument, but is apt to cause fog when using very rapid plates. In taking a child it is sometimes necessary to wait a few minutes to catch an expression, &c., and, if the slide be drawn, sufficient light passes *through* the velvet flap to cause a very perceptible veiling of the shadows.

When gelatine negatives require much retouching it is a decided advantage to do it before varnishing. When the plate is thoroughly dry warm it slightly and apply some turpentine medium (one recommended in The British Journal of Photography answers capitally), and in a short

time it is ready to work on. I find a hard pencil the best—one, two, or three H's according to what has to be done. Care must be taken not to touch the film with the hand, for, if at all warm, unpleasant marks will result. Using a mask of paper is not advisable; for the warmth of the hand may cause it to stick, and the negative will not be improved. I use an old handkerchief folded up into a pad, and never have any trouble. When the retouching is completed varnish as usual, and see that it is quite hard before putting paper on it.

Some commercial plates are plentifully plastered with dabs of emulsion on the back. These can be removed easily while wet, but when dry stick like the proverbial limpet.

These little items do not seem of much consequence, but sometimes give rise to a considerable amount of worry, which a little attention may prevent.

"TAKING" THE FIRST-BORN.

By Charles King.

The dangers, difficulties, and troubles which beset the operator when engaged in the hazardous task of imprinting on the sensitive plate the prepossessing features of the first-born is a subject truly worthy of Merry Christmas literature. It requires an immense amount of forced joviality to look back with complacency upon one's trials with the "finest infant in Christendom." First in order in the realms of memory comes the troops of friends—erroneously connected with honoured old age—who will insist upon all coming into the studio on the trail of the "treasure." Mamma's fond remark that you will have "no trouble at all with him, Mr. Operator" is drowned in the yell with which the atom denounces the sophistry of his relative. The operator smiles faintly and replies that he is sure of it, and curses deeply under his breath. Having got his plate, the "mug faker" puts on the "I must dissemble" expression of the distressed young lady in the play, and prepares for the performance.

For the time being he loses all resemblance to the human species, and, to the admiration of all beholders, imitates with accuracy the lower order of animals. The cat, the dog, the mouse, and the lowly ass pass in review before the audience in his frantic endeavours to fix the attention of the first-born. Though quite an extraordinary amount of deference is paid to "baby" on this occasion, it must not be inferred that the lovely infant has it entirely its own way. No! its body is taken up severally by the vassals and serfs in attendance, and shook up like a medicine bottle in every interval between the acts, when the glare of the operator's eye begins to hint at insanity.

At the most desperate pass the scientific gentleman's "boy" is summoned like a second Mephistopheles from the shadowy regions below, and proves himself an ally of no mean order. Posted securely behind the staircase this ingenious youth favours the first-born and family with a series of those ear-piercing whistles with which the "gods" welcome Mr. Henry Irving in the character of "Mathias," and in this manner petrifies the "darling." Should this not have the desired effect, the "boy" will invest himself in various fanciful characters—which the operator wisely omits from his *répertoire*—and so startles the firstborn with

the power of his resources that that impracticable infant incontinently "throws up the sponge." It is, however, after all this, ten chances to one that some of his cousins and his aunts may not approve of the exact altitude of the first-born's nose or the angle of his mouth when the "proofs" are sent home, so that the unfortunate professor may predict its being on the "bills" again in less than a fortnight.

With these advantages and food for excitement it will be seen that the life of a photographer is not such a dull one as an undiscerning British public might be led to imagine.

ARE WE PROGRESSING?

By Andrew Pringle.

On examination of the work in our annual photographic exhibition the first and most prominent thought that enters the mind of a photographer (especially a country photographer, who has but few chances of comparing his work with that of others) is—Am I keeping up to the times? The next is—Is our art progressing? Such were my thoughts on entering our show-room in October, 1881. Whatever may have been my answer to the first question, I propose to dwell a little on the second. Could I hit upon any subject likely to be of use in the future I should seize upon it for my contribution to this work, for such I conceive to be the special province of the Almanac; but, failing such subject, I must fall back upon a sketch of my ideas as to our past and present.

That enormous strides have been made in our science from its infancy till now it would be ridiculous to deny, and that its progress has been as rapid as that of any other science—except, perhaps, spectroscopy—is, I think, a fair statement. But my object is to deal with the artistic side of the question. I wish to inquire have we progressed in the æsthetic qualities of our work; if so, how much, wherein, and why?

At the earliest stage of photography it was treated rather as a curiosity of science than anything else, and experiments were confined to printing *silhouettes* and so on; then people began to photograph landscapes, and here our art probably had its birth. Then portraiture came into vogue, but so long were the requisite exposures that art in expression could have but little hold, nor could excellence of composition play any great part in the work. When, however, the science brought reasonable exposures within our power Art began to make her mark; for the most artistic work, of whatever kind it be, will always command the greatest success. During the supremacy of the wet collodion negative process our work reached a very high pitch of excellence; but when the ease and convenience of dry collodion and kindred processes seized the fancy of most of our amateurs, our artistic qualities—and, even to some extent, our operative ones—fell, in my opinion, a step back. I have looked through the albums of several friends, and in almost every case I find the general qualities of the wet-plate work to be in advance of the dry collodion process; while, again, in a most striking way, beauty blooms forth anew with the era of rapid gelatine work. In the dry collodion period I recollect hard, black and white prints, blurred foliage, and a wealth of evident spot-touching on

the prints. The subjects, too, in old dry-plate days were, to say the least, monotonous and lifeless—peaceful dells, placid streams, immense sketches of nothing particular; but nowadays we have life, motion, and variety. *Genre* subjects have become easy, while within our grasp are animal and infant life. No landscape now need lack appropriate animal life. A deer herd may browse amid our frost-covered trees; youthful, beauteous maidenhood may grace our sylvan scene; ships with bellying sails may sail across our ocean; and birds flit athwart our sky. And, brethren, this is progress—it is art! If it were that such rapidity were gained at the expense of quality I would none of it; but, on the contrary, I maintain our work is now better in every respect than it has ever been. I do not find that rapid work is inimical to excellence; some of the most perfect technical work on our walls is most rapid on the face of it. My cry, therefore, to all, and my endeavour for myself is—"More rapidity!" Ten—nay five—years ago we should have been laughed at had we attempted what anyone can do now; ten years hence what may we not accomplish!

One point, however, with reference to much of our work I must touch upon. Are we not getting too "namby-pamby," and neglecting breadth and brilliancy? I fear we are. It appeared to me (tastes differ) that we had, *as a body*, far to much of the fine, soft effect, while hardly a man gave us anything bold or rugged, such as the mind likes, as an antidote to the relaxing effect of softness. Let us try and improve that next year.

On the whole we are progressing. Let us push on—on—on—that we may compel admiration and justly claim our place in the world of art.

THE STUDY OF LITTLE "BITS."

By A. F. Genlain.

As an initiatory step to art productions there is probably no better one than the study of little "bits" carried on with the proper spirit—that is, not tamely or blindly, but with intelligence, judgment, discrimination, and taste; for, even in secondary things, these qualities are not only required but will certainly be brought to bear by any superior mind. Besides, such will not think this way of setting to work irksome, but will from the outset appreciate its sterling value. In the same way that some continental art schools make it a point for the art students to go in for every minutiæ that may be of value to aspiring artists, down to the tasteful folding of the drapery on the lay figure or the living model, and painting the same, once *in situ*, so may the aspiring art photographer descend to fragments and "bits" to obtain power to do greater things.

Now, whether in town or country, little "bits" are plentiful everywhere, and, oftentimes, not only interesting but positively beautiful to a cultivated eye. The stable, the stable yard, the cow shed, the alley, the courts, the rugged garden walls and parasite plants thereon, with, mayhap, creepers growing along the same, and some plants or other, wild or otherwise, in front, may form excellent and interesting materials to study and depict. It is not always the ambitious composition that pleases most, but very frequently secondary subjects skilfully and

tastefully treated. The dog's kennel, with litter spread on its threshold, and perhaps the inmate with his sleepy head laid down on kennel aperture, and the rough wall at the back and broken flagstones in front, form a picture that the deep-seated, philosophical mind of Landseer would not have disdained, and which may surely be enough for a student. The hedge-rows, teeming with lovely wild flowers, and in proximity to a "bit" of broken fence all weather beaten, the old stile and surroundings in a dilapidated condition, with perhaps a fragment of a vista beyond, form excellent materials of the desired kind. The chicken house, the pig pen, the edge of the farm pond, the barn door and peep in the barn corner, even the dunghill with perhaps a chicken or two lying on the same on a hot summer's day, form no inappropriate material for study, and such as would command a ready sale in the market. These are a few of the many little "bits" abounding in every direction, and to which the attention of the student may be profitably directed.

Then, when sauntering, camera in hand, for some such, we suddenly come upon a cottage window, partly surrounded with ivy and profusely decked with fine flowers, cultivated by its feeling though humble occupant. This is our time quickly to make ready and secure a good study; but wait a little, let us not plant the camera haphazard. The window is now in front of us, the sun on our left. Then let us studiously set the camera on the right of the window, so as to take this last obliquely, thereby doing away with those nasty horizontal lines, and, at the same time, so divide our lights and shadows as to obtain a good relief. Were we to place the camera so that the carrier faced the sun—*i.e.*, to the left of the window—the shadows would almost be *nil*, and we should be deprived of the relief that gives such life and charm to a picture. But wait! here is a thing unlooked for! The old cottager has come to peep at us, and the rugged head is splendidly framed, because naturally and beautifully, by the ivy, flowers, and partly-seen window framework. "Would you kindly sit still a moment to afford me the pleasure of including you in the picture?" and the polite gesture added to the polite request secures acquiescence on the part of the cottager, and what was intended to be a mere study turns out something more than was originally looked for. Perhaps a second negative is taken of the window without its occupant there, if thought desirable.

The next thing now is to so develope and intensify—if such operation as this last be needed—as to most carefully preserve every gradation, every minute tint of delicate shading. No chalky lights, but only spare, sparkling high lights—plenty of half-tones and reflexes, and rich, deep shadows. Now we have it!—a brilliant and interesting study, which the connoisseur admires and the painter values at its real worth as a splendid bit of choice nature!

Winter has set in, outdoor operations have become trying, and still we want to study "bits." Why not build them up? "But this requires thought and the exercise of imagination and taste!" So much the better. Should we rest content to allow our minds to remain dormant? This only befits the sluggard and stupid. Then, what shall we depict? The developing dishes were taken down stairs to wash; passing the kitchen to fetch them I perceive a brace of pheasants and some

quails sent by a friend. Why; capital! Just the very thing! Now for a group of still life with the wild fowls! Perhaps you have a game-bag or *carnassiere* by you; that will do for a part of the background, the remainder of which may consist of an unpainted wood panel. Why should not your own powder-pouch and a box of percussion caps be placed in evidence? It's a natural accessory, and surely none better could be had! Now, with taste, skill, and patience we shall soon have a nice "bit," even if that hare be introduced; though it be not a bird of the same feather it, anyrate, is suggestive enough of hunting and trophies therefrom.

But our kitchen is not so fortunate. Let me see. Here's the wife's sewing machine and all the paraphernalia for the getting up of wearables; why not make something out of that? I see; your pride revolts. Well, allowance must be made for individual feeling. We'll go to your drawing-room. What a very nice cabinet you have here! and what rare and beautiful objects of *vertu* and knicknacks! Suppose we so arrange and group some of these against the cabinet as a background on that fine inlaid table. I assure you we can make a very superior "bit" out of it all. Then, put that Japanese fan at the back of that dark bronze; it will just introduce the light necessary to give it relief. That Venetian mirror will not at all be amiss behind the fine Etruscan vase, and will show the back of it, besides introducing useful reflexes on some of the darker objects. A fold of that Turkey curtain might not look bad, if artistically brought in. It need not be added that each and every additional object introduced requires care, that the grouping should be good, that shadow should be studiously relieved by light, and this last directed obliquely and at a sufficient angle to obtain adequate and substantial shadow.

It is clear, then, that all have the ready means of direct study which "bits," scattered everywhere or got up at will, offer. It, then, lies with the student to follow that course which, if diligently and intelligently pursued, must, to a certainty, result in the eventual production of good pictures.

SUBORDINATION IN PORTRAITURE.

By Willard H. Fuller (New York).

An evil which prevails extensively, and which is very offensive to any one possessing the slightest degree of true artistic feeling, is to be found in the way in which certain photographers contrive to give such a degree of prominence to the studio accessories in a portrait as to impart to it quite a secondary position in the picture.

In an otherwise very beautiful photograph, by which a certain serial before me is illustrated, it is with the greatest difficulty I can allow my eyes to remain fixed upon the pretty girl who is intended to form the *pièce de résistance* in the composition, on account of the more obtrusive attractions of an *escretoire* laden with all sorts of *bric-a-brac*—if I may thus irreverently designate a heterogeneous collection which would be almost worshipped by the æsthete. All this is right enough when the photograph is intended to be illustrative of designs in furniture, in which case a figure or two may advantageously be thrown in as a sort

of make up; but, when the picture is to form the portrait of a lady, all else should be kept in a state of the strictest subordination.

Again: as regards the relative degree of subordination existing, or that ought to exist, between the face and the dress of a lady, what I have said concerning the accessories and the lady applies with equal force to the face and the attire. We all know that feminine human nature—especially here in New York—has very decided opinions relative to the all-importance of rendering the fullest justice to the skill of the *modiste*, and some carry their self-abnegation so far as to be comparatively indifferent to themselves, provided their dresses—Worth's most recent Parisian effort—be *comme il faut*, in which case it becomes a portrait of a dress *and* a lady. Let it be the effort of the artist to do justice to both under such circumstances, but the task is a difficult one.

RETOUCHING.

By J. Thomson, F.R.G.S.

Gaston Tissandiere says, in his advice to retouchers:—"Give us the human face." There are photographic portraitists who affect to disregard the value of a good negative, and who affirm that they only require a suggestive basis to work upon by way of a negative. They can do anything they please with the pencil, and so improve a bad negative as to produce a pretty picture resembling the general run of people.

No one can doubt the danger involved in re-making a negative with the pencil, in remodelling fatty outlines, or clothing the shrivelled cheek with flesh and "dodging" double chins. As the needle and pencil glide nimbly over the plate, respectable old age and character may thus be offered up on the altar of pseudo art. After all the skill expended by the high priest of the pencil in re-making what was once the image of a human face and form, the result is pretty, after the fashion of waxwork, and nearly as lifelike.

Future generations will look upon our elaborately-retouched photographs (when the art of making negatives by pencil is forgotten) and speculate upon the lack of character, good or bad, expressed in the faces. They will find difficulty in accounting for the evidences of preservation in the aged, who passed to their graves without spot or wrinkle. The unfurrowed brow and textureless skins of the people of our time, and the perfect placidity of the faces portrayed, will also appear unaccountable when reflecting upon the hard-working, hard-thinking race they represent. Many of the permanent photographs now being produced are destined to become historical, and to figure in the collections of the distant future.

But the evidence of some of them will prove conflicting, as no two portraits of an individual will convey the same impression to the mind of the spectator. They will prove as valueless as historic documents with the leading facts blotted out. The deep furrows in the faces of our first-rank men are, as a rule, the registration marks of a life of intellectual labour. They are of slow growth, like the wood of the oak, and in a portrait may be destroyed by a few ill-devised touches of the pencil.

I do not advocate the total abolition of retouching. The pencil when properly used is an admirable supplement to the work of the camera.

Many may say of retouching—"That is our chief source of revenue!" Opium is likewise a great source of revenue. Opium is, for all that, an excellent drug in itself; and, as for the retouching pencil, it is an admirable tonic for the face of a faded, weakly sitter. Opium and lead are alike poison when used in excess.

My own conviction is that in retouching it is always desirable to start with a good negative, and, if a gelatine negative, it reduces the work of the pencil to a minimum. The refinement of a good gelatine negative can only be modified with advantage by the hand of a skilful retoucher. The difficulty is to know what to leave untouched. A knowledge of the position and action of the facial muscles will enable the retoucher to modify the expression of a face without interfering with its best characteristics. It is unwise to proceed from the forehead downwards, filling up every wrinkle and hollow, and leaving the features above to speak for themselves. It is only by studying the face as a whole and as the true index of the mind and of character that we can determine what to alter and what to leave alone.

In conclusion: I will only add that the retouching phase—or craze—of photography should be studied with the view of improving it out of sight if not out of practice.

PHOTOGRAPHIC BLURRING *VERSUS* ARTISTIC BLURRING

By Andrew Bowman.

Between the kind of blurring produced by the photographic artist's lens, and the blurring or softening and blending practised by painters in their works, there is little or no relationship unless it be with regard to aërial perspective in landscape, which the better class of view lenses render with great accuracy.

The great defect in the portrait lens—as the merest tyro in the photographic art knows—is that it has only one plane optically sharp, all in front and rear of that plane rapidly passing into blur, and, finally, obliteration of all form, relief, and outline. Increasing the diameter of the lens only increases the evil, and brings its inherent defects more prominently into view, such as the shortening or rounding of a long face, the thickening and, consequently, apparent shortening of the nose, and the conversion of the hairs of the beard into the semblance of cordage, &c., through the extraordinary diameter of the lens compared with that of the human eye, seeing, by means of its marginal surface, too far round objects less than its own diameter, and too much of objects greater than itself. In other words, it sees single objects from too many points of view, all clustered together within its own circumference.

The painter is not hampered in this way in his work. He may have different degrees of sharpness in different parts of the same plane (near or distant) for the purpose of bringing some particular feature in it into more prominent relief, or to heighten the general effect. The blurring he practises is related more to aërial perspective than to optics, because the eyes have the power of changing their focus and degree of convergency with such rapidity that he can see at a glance any plane of an object equally sharp.

Although the painter sketches near objects—such as the head of a sitter—as seen with one eye closed, what he really tries to depict on his canvas is the semblance of the relief produced by binocular vision, subordinated only to the laws of pictorial representation. And for this very reason (paradoxical though it may seem), if we wish to form a correct estimate of his success in this respect we must view his work with one eye closed, or, better still, through a tube which will exclude surrounding objects from view, and cut off all extraneous rays of light from entering the eye, except those which are reflected from the surface of the picture. For when viewed with both eyes they constantly try to destroy the illusion by telling us that the picture is a flat surface, and that the objects depicted on it have no relief at all. Because their relief is only virtual, therefore the eyes do not require to change their focus and the convergency of their axis when directed to any point near or distant in the picture to see it sharply.

The blurring or spreading of the outline in paintings produced by the breaking or intermixing of the colours of the flesh and drapery with that of the ground may vary from a line to a-quarter of an inch (or more) in different parts of the outline of the same figure, according to its size and the degree of definition or effect of melting away intended to be produced, especially in pictures painted on a low key, where the shadowy parts of the one merge into that of the other. Although this intermixing of the colours is technically called "uniting," it has, in reality, for its object the separation of the two, so that the ground may appear to recede and the flesh appear to round away in atmospheric space; and by this device, if it be well executed, the effect of perfect relief is obtained.

A photographer unacquainted with the technical artifices resorted to in the production of a painting might, readily enough, suppose that this blurring is an imitation of the spreading of the outline he sees in the most distant parts from the focal plane—in large bust portraits taken direct with large portrait combinations. But that is not so. Viewed at a proper distance the blurring in the painting disappears and perfect relief and definite outline takes its place; whereas in the photograph it remains blur, and nothing but blur, at whatever distance it may be viewed, for the reason that a single portrait lens—though its diameter may vary from two and a-half inches (the average distance the eyes are asunder) up to nine inches—cannot transmit the full effect of binocular relief any more than a single eye can transmit the sensation of it. Though the portrait lens, by means of its back combination, can see a wider field moderately sharp, the eye has the advantage over the mechanical instrument of seeing objects as they are more perfectly, from the smallness of the diameter of its lens, which is a highly-elastic substance, and which, by means of the suspensory ligament that holds it *in situ*, can change its focus at will by altering its convexity, and, in conjunction with its self-adjusting diaphragm, the *iris* (two qualities the optician can never hope to imitate), makes it serve all the purposes of the photographer's whole stock of lenses rolled into one. The image impressed on the sensitive plate in the camera is transmittted by a rigid instrument which, "unlike the eyes," is limited in its focal range. The image impressed on an artist's mind through the eyes is the product, or sum total, of a survey

of the object from its nearest to its most distant visible point, perfected by the duration of the image on the retina. It is this mental image which the painter tries to depict, and, "unlike the camera," not what he can see with eyes converged on any single point of the object. The painter may fail from want of skill. The photographer's efforts, apart from skill, are baffled by the instrument he is obliged to use.

Sir David Brewster, more than a quarter of a century ago, demonstrated that the highest possible artistic results can only be obtained by a lens of the same diameter as the lens of the eye. Although the subject is an old one, a couple of his more striking proofs, briefly stated, may not be out of place in an annual like The British Journal Photographic Almanac, as there are always fresh recruits joining the ranks of the photographic art to whom an old subject is new. He says:—

"If we use a lens three inches in diameter, stopped down to a-quarter of an inch aperture, we will obtain by it an approximately-correct picture of a person sitting for his portrait, or of any object in relief. If we now move the aperture one and a-quarter inch from the centre towards the margin of the lens to the right, and afterwards the same distance from the centre towards the margin to the left, and take a picture through each margin, we will find on examination that we have obtained three distinctly dissimilar pictures. Indeed, the right and left pictures, being taken from points two and a-half inches apart, will be sufficiently dissimilar to give a solid figure in the stereoscope. And as the quarter-inch aperture can be placed in about 130 new parts within the circumference of the lens, it follows that a picture taken with its full aperture will be a conglomeration of 130 dissimilar pictures no two points of which are coincident, or, to use the language of geometrical perspective, the photographic picture is a combination of 130 pictures of the sitter taken from 130 different points of view. A perfectly-correct picture is one obtained by the smallest possible lens, or from a single point of sight in the centre of the aperture."

Then, again, as a more striking illustration of the distortion produced by large lenses, Sir David Brewster says:—

"Let us suppose that we take a picture of the jerboa or leaping hare, as figured by Buffon, with a lens eight or nine inches in diameter. The animal is about four or five inches in breadth; and in a front view of it, when standing on its hind legs, its long tail is entirely hidden by its body from the photographer's view; but the giant eye of the camera sees its tail by means of its marginal surface, and will give him a picture of the jerboa with its tail in front of its stomach, or, what is the same thing, on a plane surface with its tail seen through its stomach! For the same reason all objects less than eight or nine inches—the diameter of the lens—will be transparent to other objects situated at certain distances behind them!"

The advantage of Paddy's gun, which was constructed to shoot round a corner, will be obvious, especially in these days when one is clamouring for the three "F's." But from the above it will be equally obvious that a photographer's lens which can see round a corner possesses no pictorial advantage whatever.

The moral of all this is that if we wish successfully to attempt certain pictorial figure subjects which come within the range of photographic means of representation, without resorting to combination printing, or moderately-large direct bust portraits, which will require the least amount of retouching on the negatives and proofs to correct the blurring produced by the lens; for, however necessary retouching may be, it

more or less detracts from the photographic texture of the work, or if we wish to produce small and more perfect negatives suitable for enlargement to life-size pictures which are not intended to be buried under oil paint, we must use smaller lenses—such as an adaptation of the view lens—for portraiture in good light, now that we have acquired a new power in the gelatino-bromide process.

A NEGLECTED ART.

By S. W. Bultz.

There is a style of coloured photograph that has been almost, if not quite, neglected (at least in this country), though one well adapted for either large or small work, yielding to none in beauty, and capable of being executed by most photographers, professional or amateur, though my object is now more especially to engage the attention of the profession.

The picture I speak of is coloured at the back. The practice is not new; it was common at one time to transfer mezzotints and other engravings to glass and colour them from behind. Since then many have discovered that photographs will bear treating in a like manner, and sanguine patentees have told us that "their particular method is so simple in itself and so easy to work that any person of ordinary capacity can, with a very inferior photograph and in an incredibly short space of time, produce a perfect gem of art rivalling the finest miniature or enamel." This desirable end is *not* to be obtained—as you are led by them to suppose—by merely smearing colour in an almost haphazard way on the back of a photograph made semi-transparent by wax, oil, varnish, or similar means, but by careful painting, by one who has some knowledge of art (and the better the artist the better the result is likely to be), and, above all, it must be worked on a suitable base, without which all labour would be wasted.

I have worked, I think, all methods published, and some not mentioned, and have come to the conclusion that the only one that can be worked successfully is *carbon on glass*. This process, if properly carried out, bids fair to become the picture of the future.

VIGNETTING.

By G. G. Mitchell.

Nothing is more beautiful, as an enhancement of the general effect, in a photograph than a well-managed vignette when such treatment is desirable. A picture otherwise commonplace or defective may be transformed by its aid into a really attractive and artistic piece of work. It may be difficult just to say wherein the real charm of the vignette lies. It doubtless consists of several things combined. The softness and mystery of suggestiveness contained in it appeal at once to the appreciative eye; for there are actually persons who do not understand it at all, and look upon it in the light of a defect—something analogous to fading in a photograph. It is precisely because vignetting is an artistic class of work that it is not always well done—cannot, indeed, be always well done, considering the hands to which its execution must often be entrusted.

How much to vignette of a subject, and the form and character of the graduated outline, are questions which do not naturally find ready answers from all printers; and so there comes to be produced good, bad, and indifferent work.

The old ruby-coloured glasses, with their clear oval centres and more or less hard edges, were for the most part abominations, giving one uniform shape to all pictures over which they were laid, whether it suited or not, and most likely oftener not than otherwise. Their common fault lay in being too completely oval, and thus destroying in the finished work the chief excellence of the vignette, which in its best examples ought never to call attention to shape. Its effect only should be felt, and not the mechanical means by which it was produced thrust upon the observation.

To make a hard-outlined vignette is the worst a printer can do for his or her work, and this is to be all the more regretted since under certain conditions good work could be done with the same amount of trouble.

For pictures beyond the smaller sizes it is unquestionably best to make special vignetting mediums, in order to meet properly the different demands of each subject. Many and various have been the devices employed for this purpose. An opening fringed with cotton wool, to give the necessary softness, seems to have had at one time a wide following. Paper masks with the openings serrated have their advocates, while others merely use simple openings, &c., &c., and no doubt all may succeed equally well when proper attention is given to the work; but, in order to succeed, there is no question but much more trouble and attention are required by some of these plans than by others. I never could see how a cotton-wool-made vignette can be else than clouded and unequal unless a great deal of care be taken with it, and the same thing applies in a lesser degree to notched paper shapes. After trying many ways suggested I have found in my experience the best to be at the same time one of the simplest means of accomplishing the desired end. I cover the printing-frame with opaque paper, having an aperture of the required shape and size cut out in it and raised—as all good vignetting contrivances must be—half-an-inch or more from the negative, as the effect desired may determine the height increasing with size of plate. I cover this aperture entirely with tissue or other thin paper and leave it to print, slightly inclined towards the "bright side of things." It may be all the better for a margin of notched paper round the opening, but the nature of the case will determine that; the chief virtue lies, I think, in the aperture being wholly covered with the thin paper. No doubt the printing is slower by this method, but then it is better done, and that more than compensates for a little delay.

All revolving tables and apparatus for moving the frames while printing is going on are good, but are chiefly desirable where the apertures are open ones. The operation, as I have tried to describe it, is not so dependent upon either motion or frequent shiftings, and it has the advantage of allowing the frames to be exposed to full sunshine, if that should be required. A simple form of this appliance can also be found in a sheet of glass or thick cardboard manipulated in the centre and covered, as already stated, and merely laid upon the frame when printing is commenced.

AN INSTANTANEOUS SHUTTER TO WORK IN FRONT OF THE PLATE.

By B. J. Edwards.

Since the introduction of rapid dry plates many exceedingly-ingenious contrivances have been designed to effect the exposure of the sensitive plate for a very short period to the rays of light forming the image. In nearly all these numerous and various contrivances, whatever mechanism be employed the principle is the same, the lens itself being uncovered and again covered by means of an opaque shutter made to pass in front or behind the lens, the shutter having an aperture through which the light is allowed free passage during its momentary transit.

It has been pointed out that there are certain disadvantages inseparably connected with this method of effecting the exposure. First, there is a serious loss of light, arising from the fact that the plate is only exposed to the full rays from the lens for a fraction of the actual time of exposure; also, an unequal diffusion of light is caused by the shadow of the edges of the opening in the diaphragm or shutter falling on the edges of the sensitive plate during exposure. This is especially the case when the shutter is used behind the lens, and causes an under-exposed appearance at the edges of the negatives.

The above serious defects are avoided in the form of shutter which I now describe, and which was shown by me at the technical meeting of the South London Photographic Society two years ago. As this shutter has since proved as efficient in practice as it is correct in theory, I will try to give full details for the benefit of those of your readers who have not seen the original and may wish to make a similar shutter. The shutter is in the form of a spring roller blind, and is placed inside the camera as close as possible to the sensitive surface of the plate. The blind is made to roll round a pair of rollers, one of which is fitted with the spring and the other with a ratchet and knob for winding.

Fig. 1 represents the screen or blind, which should be rather more than three times the width of the plate. This screen is formed of flexible rubber cloth strengthened at the edges with narrow strips of the same material. The aperture A may be from one to two inches in width, the edges kept straight with steel wire The larger opening, C, is made the full width of the plate to allow for focussing. During this operation the flexible screen is wound round the top roller, and is prevented from running back by the trigger catch falling into the ratchet R, shown in *fig*. 2. In this position the camera can be used for long exposures in the ordinary way. To make an instantaneous exposure the screen is wound round the top roller by turning the button or handle, H, until the plate is covered

FIG. 1.

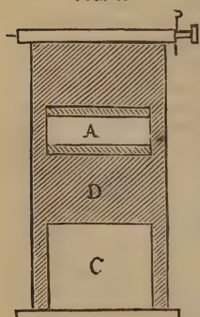
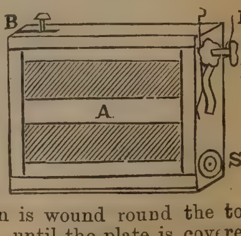


FIG. 2.



by the dark or opaque part of the screen, D. The shutter of the dark slide is then withdrawn and the exposure made by simply pressing the trigger, when the screen is instantly drawn down by the recoil of the spring, and the aperture A passes rapidly across the surface of the plate.

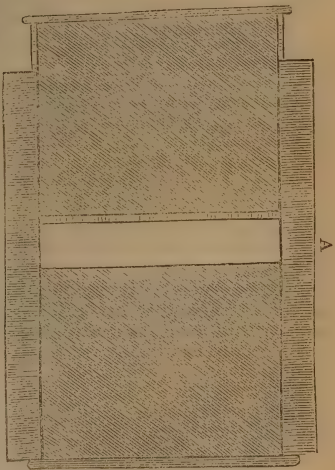
The actual time of exposure will depend upon the width of the aperture, A, and the strength of the spring. With an opening of two inches and an ordinary watch spring the time would be about one-fiftieth of a second. To give a somewhat longer exposure, and control the speed of the shutter, a small friction brake, B, is fitted to one end of the top roller, the pressure of the brake being easily adjusted by a small screw button.

A SIMPLE DOUBLE DARK SLIDE.

By Baynham Jones.

There are, I imagine, very few of your readers who have not from time to time suffered from the inefficiency of the dark slides in general use, and I think that any suggestion which may be made for their improvement will be duly appreciated. I do not claim any new invention, but merely recommend the use of a slide which I first saw some years since attached to a stereoscopic camera made by Messrs. Ross and Co.

It opens on the book way plan, and is hinged together at the back, having a rebate the thickness of the glass in each half. One plate is laid in the lower of these rebates, then a sheet of black or yellow paper, and on this another plate. The upper half is then brought down and fastened by means of a clip in the usual way.



Double Dark Slide with one Shutter Partially Open.

A is a notch for spring to shut into.

The improvement consists in the shutters, which are made only half the length of the slides, and have overlapping ends, which meet in the centre and most effectually keep out all light, the one drawing out (or, rather, partially out, as they have a stop which prevents their total removal) to the right and the other to the left. The groove of the camera is, of course, left open at both ends, so that the slide passes through similarly to that of a magic lantern, but having a spring catch in the centre of the camera groove, which shuts into a notch made in the centre of the slide and keeps it in its place.

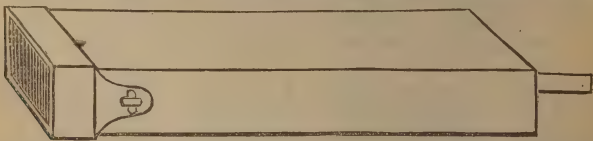
The advantage claimed for this method is the total exclusion of light when closed, the small amount of surface when the shutters are drawn out rendering a gust of wind innocuous, and they do not

interfere with the focussing cloth. I have used slides of this description for many years in my stereo. camera, and find them very efficient. The diagrams will explain fully.

AN EMULSION CUTTER.

By W. Bedford.

It has been found, when gelatine emulsion is washed in the form it assumes when squeezed through canvas or wire gauze, that it is apt to take up more water in the process of washing than is required, and the finished emulsion is in consequence too thin. This contrivance has been devised for cutting the emulsion into a more convenient shape for the subsequent operations of washing, draining, and, if necessary, drying.



It consists of a metal tube of oblong section, silver-plated inside, and terminating at one end in a short piece of pipe. At the other end is a removable cap with a series of blades of steel fixed like a grating at regular distances of one-eighth of an inch asunder. The emulsion having been prepared with the full quantity of gelatine, the cap is removed and the warm emulsion poured in, a flat piece of ebonite cut to fit inside having first been dropped into the tube to serve as a piston, and the union pipe plugged up.

After the emulsion is thoroughly set (which may be hastened by immersing the tube in cold water) the cap with its blades is securely fixed in position, and allowed to dip below the surface of the water in the washing apparatus. The plug having been removed from the union at the other end, which is now uppermost, connection is made with the water supply by means of a piece of high-pressure india-rubber tubing. If the available force of water be sufficient, on turning the tap the piston descends, and the emulsion, forced between the blades, issues in the shape of long ribbons, which are readily washed, drained, and collected either to be remelted, or, if preferred, they may be hung up on a silver wire in the drying closet to form dried pellicle.

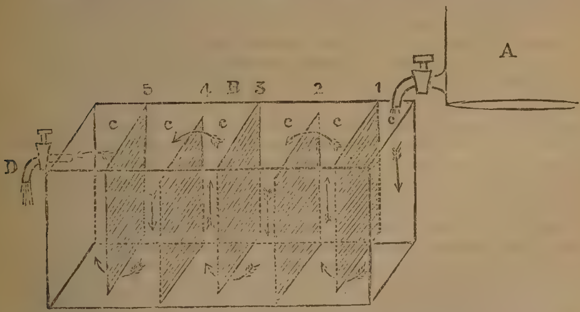
If the pressure of water be insufficient for the purpose other means must be adopted for expelling the emulsion, but the hydraulic arrangement, when practicable, is much more convenient.

A WASHING TROUGH FOR GELATINE NEGATIVES.

By Prof. E. Stebbing (Paris).

All who employ the gelatino-bromide process—professionals as well as amateurs—know the difficulty of getting rid of the hyposulphite of soda and of thoroughly washing the negative. I will not dwell upon the evils that gelatine is heir to, but describe a simple apparatus which can be made at a small cost within the means of all.

In looking at the diagram the idea can be understood at once. B is a tank, in slate or in wood, divided into six chambers by five partitions. The



A Reservoir. B Trough divided into six rooms, *cccccc*. D Exit.

odd-numbered partitions are on a level with the top of the tank but do not touch the bottom, the space of half-an-inch being left. On the other hand, the partitions bearing the even numbers touch the bottom but do not come within two inches of the top. It is obvious, then, if the top of the reservoir, A, be allowed to run, the first and second chamber will soon be filled with water. It will then run over top of No. 2, and so on until the whole tank is filled with water. The exit tap is placed one and a-half inch below the top in such a manner that the water rises above the partitions two and four just half-an-inch.

The tank must be kept full of water. Now, if a small stream be allowed to run from the reservoir, a current will soon be formed following the direction of the arrows. It stands to reason that if negatives be immersed (by the aid of a frame or otherwise) a continual supply of fresh water passes over the surface of each negative, and all soluble salts are soon dissolved out. A fresh negative might be placed in the sixth chamber, and as soon as another negative is ready it could be taken out and put into the other chambers, the last negative taking its place, and so on until it arrives in the first chamber.

By this system of washing frilling is avoided, and very often a valuable negative saved from floating down the sink by the carelessness of an operator giving too much pressure of water for the strength of the film. Try it, and be convinced!

HOW TO REPAIR SINGLE DARK SLIDES.

By J. T. Hackett.

When a dark slide has been in use several years its shutter and door get worn and shrink, so that light is admitted and fogs the plate. I will endeavour to describe the way in which I repaired my dark slide, and rendered it light-tight enough for the most sensitive gelatine plates to be used in it.

The Shutter.—This is generally the first part of the slide that gets out of order. The lower part in time rots and then breaks suddenly—at least mine did. If this should happen cut out another piece exactly like it, and fasten it to the other portion of the shutter in the same manner as the broken piece was. I will now assume that the shutter is whole, and that it is only worn and shrunk. There are two places in this part of the slide which are sure in time to admit light to the plate:—Firstly, the slit in the top (or side, as the case may be) of the slide through which the shutter works. Secondly, the hinged part frequently allows light to enter the slide. I will first deal with the slit in the top or side of the slide. To prevent light entering in this direction proceed as follows:—Get a piece of strong, thin, black cloth or velvet, as long as the shutter is wide and about two or three inches wide. Now sew a piece of string or cord (about the sixteenth part of an inch in diameter) all along one of the longest sides of the cloth or velvet (if velvet, keep the nap outside), having previously folded the edge of the cloth over the string just enough to cover it and take the stitches. If the shutter can be removed from the slide this can be easily glued in its place; if not the best way of doing it I know of is as follows:—Open the door of the slide and lay the prepared cloth or velvet (if velvet, the nap being underneath) upon the shutter, which must be closed—the corded side at the bottom, and the part that is folded over the cord uppermost. Now slip one of the upper corners between the shutter and the top of the slide (in the centre) by the aid of a thin, round-pointed knife, at the same time raising the shutter slightly. This is continued until about an inch of the cloth appears above the top of the slide. It is then taken between the finger and thumb and gradually drawn into its place, which is known when the corded part is in close contact with and all along the top of the slide inside. The corded part must *not* be

drawn up between the shutter and the slide, or the proper working of the shutter will be prevented, as it will stick fast. Care must be taken not to raise the shutter too much at a time, for if it is time will be lost, as the cloth will be puckered, and a fresh start will have to be made. The reasons for having the cord in the cloth are to prevent the light entering when the shutter is drawn up, and the cloth from being pulled out at the same time. The cloth is now pulled quite tight and the shutter drawn right up, an assistant holding it up with one hand and keeping the slide steady with the other. The cloth now being tight is bent over and tacked to the top of the slide, the tacks (quarter inch long) being driven in about a-quarter of an inch from the inside (black face) of the shutter, a slight groove (or rather rebate) the same depth as the cloth or velvet is thick having been made about three-eighths of an inch wide or thereabouts. If this be not done the bottom of the shutter could not touch the bottom of the slide, which would no doubt cause light to enter. If you have a carpenter's bench fitted with a bench screw you can dispense with the services of an assistant; if not the assistance of some one will be required. No glue is necessary, as the cord and tacks keep the cloth or velvet in its place; indeed, glued cloth could not be used, unless the shutter was removed from the slide as before mentioned.

The hinged part must now be set to rights. If the hinges are perfect all well and good; if not they must be replaced with new ones, to do which is not difficult if you get them the same size as the old ones, and the wood work is not much knocked about. If the upper part of the shutter is much broken (and cannot be easily patched up) it will take less time to make a new one than to repair the old. The parts of the old one that remain will be a good guide when making the new one. I shall now suppose that the shutter is in the main sound, but that light enters at the part that is hinged. This being the case, remove the slip of wood or knobs that act as a stop (which prevents the shutter when pulled up from being drawn right out); then remove the shutter from the slide, and just above the top of the hinges cut a groove a-quarter or five-sixteenths of an inch wide and one-sixteenth of an inch deep or thereabouts, and the same length as the shutter is wide. Now cut a thin brass or zinc plate about one-sixteenth of an inch less in width than the groove, but exactly the same length, and drill four or six holes in it equally distant from each other. Get a piece of black calico or velvet, or a double thickness of black silk, of the required width, to reach from the bottom of the shutter to a little above the top of the groove, and the same length as the brass plate, and proceed as follows:—Glue the shutter from its bottom to the top of the groove, also the calico, velvet, or silk, and place it, glued side downwards, on the glued part of the shutter, and press it in close contact, taking care to press it well into the hollowed parts on each side of the hinges and into the groove. Then screw on the metal plate (the calico, velvet, or silk being underneath it) in the groove with one-eighth inch steel or brass screws, and allow the whole to become quite dry. When dry bend the hinged part until it works freely, after cleaning away any glue with a damp cloth, knife, or glass paper, taking care not to cut or otherwise damage the calico, velvet, or silk. When this and any other trimming and cleaning up is finished put the

shutter in the slide and screw the "stop" on in its place, and it is finished.

I need hardly say that previous to glueing the shutter, the varnish or polish, if any, must be removed with glass paper from the part to be glued, otherwise it will not stick so well. The glue must not be too thick, for if it be it will cause the material to crack at the hinges (and will not hold so well), thus rendering the work done useless. If the cloth be not pressed in the crack as directed the shutter cannot be bent. The kind of stop I like consists of a strip of mahogany or other material the same length as the shutter is wide, and about one-eighth to three-sixteenths of an inch thick, and half-an-inch or so wide. If the bottom of the stop projects three-sixteenths to a quarter of an inch beyond the bottom of the shutter so much the better, as it will be an additional check to light getting in at the bottom of the shutter, and it will not have any drawback whatever.

The Door.—When the door is worn and shrunk the entrance of light may be expected. If the door has been very much damaged it will be better to make a new one, the remains of the old one serving as a guide. Some dark slides have not a door, the back being loose instead. In such cases, when a plate is to be put in or taken out of the slide, the back is entirely removed. After the sensitive plate has been placed in the slide the back is replaced, being prevented from falling out or shifting by four or more brass buttons, or otherwise. It may be asked: Which back is best—the door back or the loose back? I am rather in favour of the loose back, as, should it get out of order, it is generally more easily repaired, and all parts of it and the back of the slide can be got at better, as no hinges have to be removed.

Supposing the door to be sound: unless the screws with which the hinges are fastened come out easily (which is not to be expected, having generally rusted in) do not attempt to remove them, as in so doing the door is almost sure to get split or otherwise injured. I will now assume that the hinges cannot be got off, and that they and the door are sound, only being worn and shrunk.

First close the door and fasten it; then glue a strip of black cloth or velvet of moderate thickness and about one inch wide, and as long as the door is high, so as to cover the hinges and the slit between them. If tacks are used as well as the glue to fasten on the velvet or cloth, the utmost care must be exercised, or else the door will be split, holes must be bored for them with a very fine bradawl, but it is best not to use them. Two slips of thin metal screwed (but not sunk) over the outer edges of the cloth or velvet will be about as good a way as any of fastening it.

Now cut three strips of mahogany one-eighth to three-sixteenths of an inch thick, and about three-quarters to one inch wide, the length of each piece depending upon the size of the door; they should be "mitred" (a mitre-board being convenient) at the corners. After all the pieces have been cut to the proper size and shape they should be screwed temporarily in their proper places, to see that the corners fit nicely; if not, they must be adjusted until they do. One screw at the ends of each piece will be enough for this purpose. When they all fit well remove them from the door, and glue strips of black velvet to the underside of them, the nap being outside. When quite dry trim any

that may project beyond the ends, and screw them in their proper places, this time using more screws in each piece, placing them at equal distances from each other. The outer edges of the strips of wood must project three-sixteenths of an inch (more, if possible) beyond the edges of the door, so as to make a rebate round three sides of it. A small projection of velvet beyond the outer edges of the pieces of wood, if space will permit, will be rather an advantage than otherwise. Any velvet that may project beyond the inner edge of the slips of wood is cut off, as no advantage will be gained by letting them remain.

If the back of the slide be loose (not hinged) four strips of mahogany of the dimensions given above will be required instead of three.

The positions of the buttons must be altered, if necessary, to suit the above alterations, or some other fastening used instead.

No matter how well or carefully made or repaired dark slides may be, it will be a wise precaution to always wrap them up in a piece of black cloth or velvet when being carried to or from the camera, and the shutter raised while the focussing cloth is over the slide. By this means fogged plates caused by the dark slide will be entirely prevented.

Photographers who desire to construct their own studios, cameras, dark slides, &c., will find the information given in the first eight parts of *Every Man His Own Mechanic* of great assistance. It is published by Messrs. Ward, Lock and Co., Salisbury-square, London, E.C. Its low price places it within the reach of all. I would not be without the parts mentioned on any account.

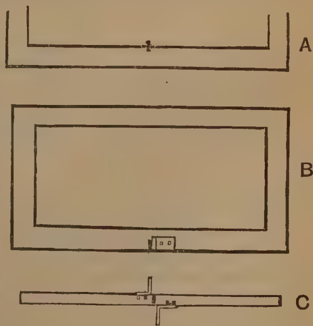
REMEDY FOR REFLECTED LIGHT IN THE CAMERA.

By G. S. Penny.

Attention has been called of late to the necessity for preventing the light falling on the floor and sides of the interior of the camera from being reflected on to the plate. This I did many years ago when, with slow plates, the danger was so much less than it is now with our hyper-sensitive gelatino-bromide plates.

My plan is to place in the camera a light wooden frame, the sight being that of the cone of rays at any suitable distance in front of the plate, and bevelled towards the front. The upper piece of the frame should be narrower than the others, so as not to cut off the image when the front is raised.

In order to adapt this position to lenses of differing foci—say in a double-bodied camera—the frame may be made to slide to and fro in a simple way. Thus:—On the floor of the inner sliding body make a saw-cut from back to front, fix in it a slip of brass so as to form a shallow rail; make a similar saw-



A View of camera back with rail in the floor.
B The frame with saw-cut.
C View of bottom of frame, showing the foot and guide pieces.

cut in the foot of the frame, so that it will slide on the rail. To the bottom piece of the frame front and back, on each side of the saw-cut, fix a right-angled plate of brass, which will form a foot and guide to keep the frame square and vertical.

By pressing the free sides of these plates towards the centre the rail is clipped more or less tightly, and the frame fixed in any desired position. When not in use the frame can be drawn out at the back, and packed inside when the camera is shut up.

A CHEAP PORTABLE CAMERA.

By the Rev. B. Holland.

Before the summer's work is well over, and one's negatives consecutively stored, the Editor is asking for MS. for another Almanac; and appreciating, as all my photographic brethren must do, his praiseworthy alacrity I herewith contribute my mite.

In connection with the use of gelatine plates portability and economy in the apparatus employed are most desirable, and to those anxious to combine the two the adoption of the camera described below is recommended. There are already in the market various handy contrivances, but they do not meet the wants of all. Changing-boxes and double dark slides are excellent in their way, but the former require some little time to bring into operation, besides necessitating the carrying of an extra package; and the latter, if a considerable number of plates are needed for an "outing," entail an expenditure which, in the case of many amateurs, is not agreeable.

The advantage of the "notion" to be described is that anyone who can use a saw and hammer can make it at home, and yet have a thoroughly-efficient apparatus containing in itself all necessaries.

FIG. 1.

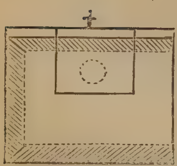


FIG. 2.

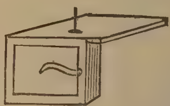


FIG. 3.

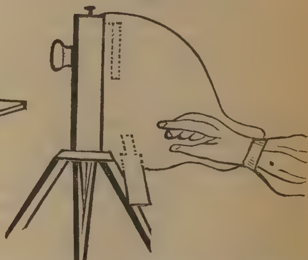


Fig. 1 represents the camera body, ten inches square and four inches deep, together with the plate-holder, five inches square, which slides between two supports fixed to the top of the camera inside, and is secured by an ordinary thumb-screw, passed through to the outside, working in a short slot. *Fig.* 2 is the plate-holder detached, and *fig.* 3 the camera in use. The sleeve may consist of two thicknesses of black lining and one of Turkey red twill inserted between, or india-rubber cloth may be used instead. The sleeve is glued and tacked close round the outside of the camera back, and attached to the loose

end is an elastic loop fixed to a button to secure it to the wrist. A pocket is made in the bottom near the camera to hold the plate-box, and this box, if made of stout cardboard to hold a dozen or more plates, may be very light. No grooving is required, for gelatine plates closely packed will sustain no damage. The focussing-screen is a loose piece of ground glass held by a movable spring screwed at one end to the side of the plate-holder. For the sake of lightness I have employed pine. Made of such wood and stained, the edges being bound with a narrow strip of leather tacked with small brass nails, the camera will be quite presentable, even in a crowd. A tight-fitting cover of American cloth and a handle on the top render it complete.

To use the apparatus :—Draw the sleeve over the head, and focus with the screw on the top of the camera. Next, withdrawing the head, insert the right hand, button the sleeve round the wrist, and drop the plate-box into the pocket. Remove the ground glass, and put a sensitive plate in its place (which can readily be done with the help of the left hand outside). Expose, using the left hand to uncap the lens, and then return the plate to the *back* of those in the box. Each plate can thus be exposed consecutively, care being taken always to put the one used *behind* the rest. Should the plates be inclined to rattle in the box, a small plug of cotton wool will keep them steady. It may not be needful to give the caution, still a beginner might need it :—Never open the plate-box until all light is excluded from the camera. If it be necessary to employ long-focussed lenses with this apparatus, an extending bellows may be easily attached in front, and I strongly recommend any who use it to adopt a *rising* front. This little addition, to anyone handy with tools, will occasion no difficulty whatever.

The above is 5 × 4 size, but is equally serviceable for half-plates ; and, after having tried several *multum-in-parvo* appliances, I have come to the conclusion that this is as simple as any, and better than many.

A CHEAP CHANGING-BAG FOR DRY PLATES.

By Frank M. Sutcliffe.

If "brevity be the soul of wit," then simplicity should be the soul of usefulness. Now that dry plates are masters of the field a simple method of changing them is necessary. Double slides and changing-boxes are too expensive for many working men, and "rigging up" a dark room is not always safe. I am indebted to an amateur for the following, which is safe and simple :—

Get three and a-half yards of yellow twill and three of black ditto. Make a bag of this a yard and a-half deep the width of the stuff—big enough, in fact, to admit the worker down to the waist. Have a string to fasten there, and make a window at the bottom, or nearly at the bottom, by cutting away nine by twelve inches of the black stuff. Sew over this a couple of thicknesses of orange silk, the same quantity of Turkey red, and two more of yellow twill.

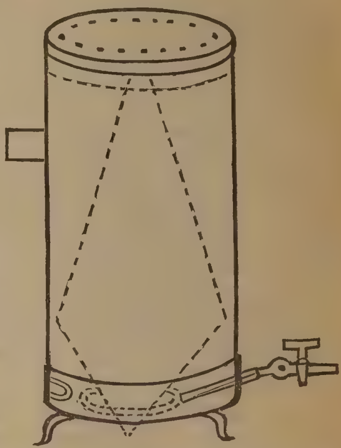
To use the bag :—Lay it on a bank, table, or whatnot, window side uppermost. Put the plate-box, slide, dusting-brush, and as much of yourself as you can therein, and, unless you are "a giant on the face of the earth," you will have elbow room enough. Be sure you get twill—not lining ; and choose a place out of the sun when changing.

A GAS STOVE FOR THE DARK ROOM.

By S. S. Crewdson.

The temperature of the dark room during the winter months, by night as well as by day, may possibly have been the cause of anxiety to others as well as myself. Having procured a gas stove which answers the purpose admirably I am induced to offer it to the notice of the profession, hoping my description will be sufficient for those requiring such, and which I think any tinman or whitesmith may construct without risk of failure.

The outside cover is simply a tube about eighteen inches long and nine inches in diameter, open at the bottom end; and about two or three inches from the top end a circle is fixed in, air proof, excepting a hole about one and a-quarter inch diameter, through which passes the top end of a retort, as indicated by dotted lines in the annexed diagram. The circular stand, upon which three feet are riveted, has holes for the admission of air, and, the edge being turned up all round, the body of the stove stands firmly upon it. A hole in the centre similar to the one in the cover permits the lower end of the retort to pass through, and sending a current of air through it into the small chamber at the top of the stove.



Inside, round the bottom end of the retort, a circle of iron pipe, having a number of holes on the top, permits the gas to play upon the outside of the retort, and heat the current of air passing through it. The end of the ring burner coming outside, the gas passes into it through an ordinary burner for lighting purposes; but behind the nozzle of the burner a couple of holes permit air to pass in also, giving a number of blue flames within. This arrangement, however, necessitates the use of a pipe to carry outside the unhealthy fumes, but has the advantage of greatly economising gas. For lighting and observation of burning three holes are cut near the bottom. Over these holes a band of sheet iron about three inches broad slides round, in which are corresponding holes. By turning it round they can be opened or closed as required. The lid of the stove (which slips off and on), having holes through it all round, permits the warm air to pass through the retort into the small chamber beneath the lid. By placing a dish of water on the lid I find a temperature maintained suitable for keeping emulsions, &c., warm.

By removing the lid and placing things on the inside cover they become hot, and, if made properly, water may be kept hot here if

necessary. In addition to this, should a current of dry air be required for drying gelatine emulsion plates in a cabinet at a short distance, such may readily be conveyed from the top of the retort through a tin pipe, the end of which may be perforated to suit th co nstruction of the drying-box.

It will be observed that the gas passes through an ordinary burner for lighting purposes; therefore, the consumption can only cost as much as one light burning. From this fact some may doubt the efficiency of the stove. However, I may say, in reply, that when turned down to about half the ordinary amount for a light the stove is warm enough all over for the hand to bear touching. In addition to this, the warm draught is the great advantage of the arrangement. However, the size of burner, &c., should suit the capacity of the room in which it is to be placed, and the consumption of gas will be in accord with the temperature desired and space to be heated.

ON THE ADAPTABILITY OF PHOTOGRAPHS FOR HOUSE DECORATION.

By the Rev. F. F. Statham, M.A., F.G.S.

The growing taste for art decoration in objects destined for household use is one of the most encouraging features of the day. It may be said, I think, to have taken its birth—or, rather, perhaps, to have awakened after a long sleep—with the holding of the Great International Exhibition of 1851, since which time an immense improvement in the designs of our carpets and curtain hangings, the style and patterns of our wall papers, the shapes and decorations of our china and earthenware, and even the forms of our meaner classes of pottery have been very sensibly noticeable. The steady work of the Art Union has also made itself felt in gradually familiarising the public with good and cheap engravings, and the recent advances in chromolithography and in oleo-painting have supplied those whose means of expenditure were small with the opportunity of decorating their walls with pictures far in advance of the old daubs and gaudy-coloured wood engravings which were so frequently to be seen, a few years since, in our cottages and humbler dwellings.

Photography, as might have been expected, was not slow to perceive and take advantage of the opening thus indicated, copies of choice engravings—in some instances, it is to be regretted, obtained without the sanction of the copyright holders—views of interesting foreign scenes, enlarged *cartes de visite*, and similar works of photographic origin soon made their appearance in our dwelling or sleeping apartments, and added a charm and variety previously wanting.

In many instances productions of rare value have thus been made to minister pleasure and enjoyment to thousands who would never, but for photography, have thought of aiming at real excellence in their room decoration. The costly price of good paintings, whether in oil or water colour, would have precluded them from attempting any extensive patronage of these noble arts, while even mezzotints or line engravings of any size or merit were commanding such high prices as to limit their frequent use. But now that it is possible, at the cost of a

few shillings, to purchase photographs of undoubted merit and originality—suitable, moreover, to almost every individual taste—it surely needs but a little more enterprise on the part of professional photographers to enlarge, to a very considerable extent, the employment of their art in this particular direction. How seldom, comparatively speaking, do we see neatly and artistically-framed photographic views exposed for sale in our shop windows? While the sellers of oleographs and chromolithographic imitations of water-colour drawings almost invariably frame their pictures, and thus set them forth temptingly and at their best to meet the public gaze and compete for public favour, the photographic printsellers confine themselves, as a general rule, to pinning the unmounted prints in their shop-fronts as though they were unworthy of framing, or were only intended for the portfolio or the scrap-book.

But this is only one aspect under which the use of photography may be adapted to the purposes of house decoration; and I conceive that the rapid growth of æsthetic appreciation will soon lead to a much wider employment of the camera and the printing-box in furnishing materials for the enlivenment of our walls. What is chiefly to be desired for this purpose is a style of pattern of ordinary wall-paper which will *lend itself* to this design. If our paper-stainers would only help us to the extent of supplying patterns of scroll-work, which should contain at intervals blank spaces for medallions or frames in the pattern itself, upon which photographs might be made to adhere, a ready application of the photographer's skill would soon suggest itself. The studio of a physician, for example, might have its medallion spaces filled with portraits of the celebrities of his profession. A musician's cabinet might witness the like spaces filled with the visages of Handel, Mozart, Mendelssohn, and the other worthy masters of the musical art; while the *sanctum sanctorum* of a clergyman would naturally have portraits of the bishops and other dignitaries of his church looking down upon him and approving his studious labours.

The halls of the wealthy might have niches on a larger scale occupied by photographic enlargements of statuary—or panellings along the staircase with lifelike groups of flowers or classic busts—and even the bedroom walls might have compartments filled with copies of the famous paintings of Titian or Paul Veronese, or the pleasing pastoral scenes of Watteau or Berghem, which would certainly afford more pleasure to the eye and rest to the jaded senses than the monotonous, chequered, or formal floral patterns which now form so large an element in our sleeping-apartment decorations. *Verb. sap. sat.* Let our paper-stainers provide us with suitable papers for subsidiary art decoration and photographers will soon have suitable subjects for *fitting in;* or, if the ready groundwork be not thus supplied, photography might soon provide artistic scroll or frame patterns of its own to be attached to walls covered with one uniform neutral tint, so as to unite at once taste and economy in the covering of our domestic surroundings.

ON INSTANTANEOUS SHUTTERS.

By William Cobb.

It is a well-recognised principle in commercial circles that supply is regulated by demand, and it is curious to note that as soon as a want is

created—whether by the ordinary surroundings of life or by the exigences arising out of our advanced state of refinement—human ingenuity taxes itself to its fullest limit in order to meet our requirements. A fair illustration of this may be seen in the neck-and-neck race between rapid dry plates and rapid shutters, rapid exposers, or whatever term we may employ to designate these (at the present time) photographic indespensables. Pneumatics, electricity, and mechanism of the highest order have been brought to bear upon their construction.

First in importance for studio work comes that very ingenious instrument known as "Cadett's shutter," which, in my opinion, for portraiture pure and simple stands unequalled. It has often been urged that it is a mistake to attach this shutter to the lens outside the camera. With that idea, however, I cannot agree, as I have frequently found, when photographing children, that a preliminary game at bo-peep with the flap has enabled me to arrest the attention, and secure such satisfactory results of the little——well, say "darlings," as I could not otherwise have hoped for; it is well to know that it is just as easy to adapt this shutter to the lens inside the camera as it is outside. Effective as this instrument is in its own sphere, something far more rapid in its action is necessary for so-called instantaneous work, such as photographing animals, boating scenes, ships in rapid motion, athletic exercises, &c., &c.

For work of this kind I have employed most successfully the shutter known as Hunter and Sands'. I will not presume to say that we have reached finality either in rapid dry plates or rapid exposers, but I cannot imagine that anything much more effective can be devised for the purpose than the shutter just referred to. Its chief point of excellence lies in the fact of its being worked between the lenses, thus giving the additional power of a stop or diaphragm to the lens, opening with the smallest possible aperture, gradually increasing to full aperture, and again closing with the smallest.

It may be that the cue for making exposures in this way was taken from a remark made by Mr. Dallmeyer on the occasion of a discussion upon drop shutters at a meeting of the Photographic Society of Great Britain some two or three years since, when that gentleman remarked that, in his opinion, the proper place for a drop shutter was between the lenses. Be that as it may, I can bear testimony to its value and that from considerable experience with it, having been able to secure by its aid negatives of objects in rapid motion possessing all the sharpness and delicacy usually supposed to belong only to those which have received a more lengthened exposure. One other point which should be mentioned is this—that by the adoption of the regulating spring, with which the instrument is now supplied, one is able to vary the exposures from (it is stated) one second to a two-hundredth part of a second.

Surely with such a power in our hands, and the unlimited degree of sensitiveness which is said to be attainable in dry plates, the coming season should show us something even still more wonderful than we have yet beheld; and that yourself, Mr. Editor, and all your readers may be spared to see it is my sincere desire.

WORKING THE LIME LIGHT PROFESSIONALLY.

By T. Gulliver.

This has been my winter business during the past twenty-two years, and the experience gained thereby may be of some service to the readers of the Almanac.

My first jet was a spirit jet, and I found it, as then made, a most troublesome and uncertain affair. It was one of the usual make, only the wick was fine wire instead of cotton. It would not work if the lantern were tilted, as the spirit ran about, the flame sometimes ascending up to the top of the lantern and sometimes so low as to be useless. Why? Because the spirit reservoir was *outside* the lantern, and the spirit found its way through a tube. This is totally wrong in principle and useless in practice.

I had a jet made in which the reservoir was *inside* the lantern; in fact, a spirit lamp with a tube underneath to convey the oxygen. This answered its intended purpose perfectly, and has been used in two lanterns (when the usual gas is not laid on) for many years. There is no danger, and the light is as steady as a candle. Why the dealers and makers still use an outside reservoir for the spirit jet I cannot imagine.

The blow-through jet I use in preference to any other, and have three slightly-different forms—one with the oxygen tube one-eighth of an inch above the hydrogen; one with both tubes level; and one with the oxygen tube one-eighth of an inch below the hydrogen tube. The first gives an excellent, steady light, uses a small amount of oxygen, and never "snaps" or goes out. This I use for a disc (say) not exceeding thirteen feet. The second gives a rather better light, burns steadily, and uses more oxygen than the first. The last is best, but requires more oxygen than either of the others, and gives a splendid light—so much so that I use it in conjunction with a mixed gas jet on an eighteen-feet screen up to the very edge. In dissolving the jet gives a loud "snap," and is rather apt, without care, to go out. I like it best of the three, as I get from it such a brilliant light. I find the mixed gases best where from circumstances I am obliged to place the lantern forty-eight feet from the screen, but as I have but one jet I use the others when possible.

The Dissolving Tap.—The best I have used is one made in Birmingham, at a cost of four shillings. It turns off the oxygen only, leaving the hydrogen full on in both lanterns. I have never found the light from one lantern interfere in any way with the other picture, and the light is up bright at once. This is not the case when using the usual dissolving tap, as, from the hydrogen being nearly turned off, some time is lost before the light comes up quite bright. My tap has been years in use and still gives me satisfaction, as the dissolving effect is most perfect and gradual.

Gas Bags.—I have for the past four seasons been using one of Hughes's make—a square gas bag. It is 27×23 inches, and when full holds over eight feet of gas. It has double side and end boards, and this, with the top and bottom boards, make it heavy. It closes down to three inches deep, has the advantage of requiring but little room and is handy for travelling; but I am inclined to think the usual wedge-shaped bags are best.

Gas Holders.—Of Chadwick's, Young's, and Noton's I have only seen one in use, and that was a copy made by a working gas-fitter, who considered the high-priced original far too expensive for everyday use, and so made one for a few shillings. I have seen it used three or four times, and it has acted very well. The drawback is that the gas makes a bubbling noise in passing from the retort, and now and then the water rushes out and is thus spilled about the room. About fourteen pounds' pressure on the top of the gas-holder seems to be quite sufficient, and it is really not much trouble to work. In some cases it would be less trouble than gas bags.

NOTES ON DEVELOPING ROOMS, &c.

By Samuel Fry.

The persistence of error was never more abundantly specified than in the difficulty found in inducing photographers to work in a light room instead of a dark one. In the large majority so dim is the illumination that on entering from a studio or the open air some time is required to sufficiently accustom the eyes to the gloom to discover any of the surroundings. Now, the reverse should be the case. The most rapid plates made for use may safely be developed or changed in a room of which all details can be seen readily on entering, and in which the columns of a newspaper could easily be read.

The counsel given to photographers, even down to the present time, by writers is seldom good. I will briefly describe what may be looked upon as a suitable developing room for rapid dry plates. One must, of course, be guided by the construction of the room, but do not fear the window being too large. Mine is four feet six inches high and nine feet long, none of it being shut off. Avoid ruby glass; if it be reliable it is so dark that, unless a very large amount is used, a dull day stops the work.

I recommend two systems, both carefully tested and known to be good. One is with thin yellow tissue paper fastened up just clear of the glass, and an inner cover of Turkey red twill. The latter can have a portion made to raise on a roller if needed. During the brightest weather in June I used the saloon of a screw steamer to change and develope in, and not in a single instance was there wanting the clear glass round the edges and in the shadows which always indicates that the light is safe. I really was very anxious till I ascertained by development that all was well, for the room was brilliantly illumined. During a voyage on the Thames, when large numbers of most rapid plates were exposed, no sign of fog was ever found. Some people—many, in fact—paint their developing rooms black, which indicates their ignorance of one of the first principles, viz., that the reflections from a white surface coming in through a properly-coloured window cannot possibly acquire actinic power. The black walls make it like an undertaker's place. This yellow tissue and Turkey red twill are capital for covering over lanterns for artificial light. All should have the means of turning on at any moment such a light; in dull weather and towards evening it is always better.

The second plan is by the means I have before described in these pages, namely, the well-known orange paper stained by an alcoholic

solution of *magenta* and rendered translucent by boiled oil. This takes a capital colour, does not fade, and two thicknesses are sufficient. But the first plan is so simple that nothing more is required.

Now, with regard to developing dishes. Buy a few sheets of stout tin plate at the ironmonger's, and have them made into dishes three-quarters of an inch deep. For two shillings and sixpence I got a 12 × 10, two half-plates, and two quarter ones made. The solutions do not affect them. All the *papier maché* dishes, ebonite, or gutta-percha have a short life.

Now, with regard to developing. It is clearly shown by the closest observers that double or treble the usual quantity of bromide is a great advantage, and does not, as is supposed, require longer exposure. One has also the benefit of much clearer shadows and half-tone. The longer glycerine developer is used the more it will be liked. The action of the glycerine is to prevent deposit on shadows, and it effects a very important economy of pyrogallic acid. The additional quantity of bromide also does this. I am inclined to think that by the use of 150 grains of bromide of potassium in six ounces of water, with one ounce of ammonia ·880, instead of 60, advantage all round is got and great economy.

A FEW SIMPLE APPLIANCES FOR AMATEURS.

By Kenneth Bean.

In drying small-sized negatives I adopt the plan mentioned at a recent meeting of the Liverpool Amateur Photographic Association, namely, after having fixed and washed the negative, dry the back of the plate with a clean cloth ; then draw the surface of the tongue across the film longitudinally, thus squeegeeing the moisture from the gelatine—of course, rejecting the water, which, if tasteless, will prove the elimination of the hypo. After intensification with mercury and ammonia this mode would be dangerous ; so I first dry the back and then gently dab the film with a fine cotton handkerchief, the negative drying rapidly after this treatment, and even where frilling has commenced it seems to stay its tree-like ramifications.

I have used my bath room as a dark room occasionally, having fitted a frame covered with the usual dark twill and brown paper to the window-case, fastening it with turn-screws ; and for a light two thicknesses of the much-abused *canary medium*, which I find sufficiently non-actinic for ordinary work, even with extra-rapid plates.

To wash prints and negatives I use the bath, placing a basin under the tap, with the prints in. I had used the wash-hand basin, but occasionally had an overflow, through the prints getting across the escape holes in the basin side.

The only place I have for printing is the roof, upon which I have rigged a small stage sufficiently large to hold a dozen 5 × 4 frames. It is levelled with the attic skylight by short legs let into battens laid on the roof, and nailed to the frame of the skylight. In wet weather I have a wire frame under the skylight, and can print from half-a-dozen frames at once—of course, much more slowly through the glass.

In using a round wash-hand basin to wash negatives after intensification a common flower-pot inverted is very useful to hold the negative under the tap, with the addition of a water-pot rose to diffuse the flow over the plate.

THE POCKET CAMERA AND ITS SPECIAL WORK.

By George Smith (Dudley).

A thoroughly-efficient pocket apparatus seems to me to be still a great want. The so-called "pocket cameras" are "a delusion, a mockery, and a snare." A quarter-plate camera, with stand and half-a-dozen plates in the dark slide, weighs some seven or eight pounds, and the camera is so bulky that it cannot by any possibility be carried in an ordinary pocket. It is a misnomer altogether as at present constructed.

My idea of a pocket camera is one that really can be put inside a coat pocket. Possessing this, with a couple of plates in a double dark slide in the other pocket, and a walking-stick or umbrella-stand such as I will presently describe, the amateur or artist is ready for anything that, Micawber-like, may "turn up." Such a camera should form the artist's constant companion. It ought to accompany him everywhere in his rambles, and be always ready when wanted. Numbers of studies present themselves when least expected to those who are on the look out for them. Many persons go about with their eyes shut in an artistic sense, and many charming "bits" are passed by unobserved.

> "A primrose by a river's brim
> A yellow primrose was to him,
> And it was nothing more."

But who, with any artistic feeling in him, when he has seen some beautiful "effect" of light and shade in the landscape, or some fleeting cloudscape that has been especially beautiful, has not felt—"If I only had my camera with me to secure this!" Groups of harvest people, sportsmen with their guns and dogs, fishermen, picturesque figures, children at play, horses grazing and at work, sheep on the mountain side, cattle, farmyard scenes, and other subjects are constantly cropping up when you have not got your camera with you. Such subjects as these seem to be especially suitable for the pocket camera.

The extreme sensitiveness of gelatine plates renders all these things now possible. The use of a prism on the lens would perhaps be very useful in taking some of these subjects, and also in frustrating the object of the irrepressible "'Arry" and his friends, who will sometimes thrust themselves into a conspicuous place in front of the camera "to have their pictures taken."

To go out for a set day's photography frequently means to undertake some special work, and plates cannot be spared for anything that is met with on the way; but studies such as I have referred to would form an aim and an object whenever the photographer "takes his walks abroad," and they are just what a painter would delight in. A folio of such studies would be infinitely enjoyable, and quite out of the ordinary groove of photographic subjects. These studies can be afterwards enlarged and, notwithstanding all that is said to the contrary, would be simply invaluable to artists.

To my mind, what is wanted is (say) a 5×4 camera—or, rather, a $5\frac{1}{2} \times 4$—which would fill a cabinet card better, besides being better proportioned. The quarter-plate would give rather insignificant results. This should fold up into less than one inch deep. It should be of the

best workmanship and provided with every adjustment, so that it might be set up in a few moments. The dark slides should be grooved at the side, and slide on a strip of brass screwed on the back of the camera frame something on the principle described by Mr. Baynham Jones in the ALMANAC for 1878. This would save space. It should be fitted with a Ross's or Dallmeyer's rapid lens of six or seven inches focus. If the lenses of the combination were mounted after the manner of Grubb's "portable mount," so that the lenses could be moved closer together when not in use, it would be an advantage, as the lens could then go inside the camera. I think a bayonet joint or something of the kind would be better than screwing the lens into the flange, as it could be more readily removed and refixed. The stand should be a walking-stick a little longer than usual, made of bamboo, with a top to screw on. Inside of it are two pieces of light tubing of the same length, sliding into each other and pointed at one end for fixing in the ground. There should be a *light* brass top to fix the camera upon, made on the principle of the theodolite stand, with tapering wooden legs about six inches long only, so that the top might be carried in the pocket. These short legs being inserted into the walking-stick tubes, the stand is complete.

The Sciopticon Company formerly made a stand somewhat on this plan, and with a little alteration it would be a very convenient form of stand. Its great fault was that the legs, being pushed into a rigid top, could not be extended, and it, therefore, could not be used on uneven ground. Should it be wished to obtain views in stormy or uncertain weather—and, as a rule, the best landscape effects are to be obtained then—the walking-stick could be provided with an umbrella frame and covering, thus making a serviceable umbrella of it. Extra-long ribs could be obtained at most umbrella makers, and the umbrella would not then be conspicuous by the extraordinary length of handle. A stand four feet high might thus be readily obtained, which would be sufficiently high for most purposes and would also be found fairly firm.

What I have here suggested can be done without any real difficulty. After all, it is only a matter of good workmanship. Our manufacturers appear to think their work should be turned out to last for all time, and that it should be as massive and heavy as possible to entitle it to be called "sound English work." They go pretty much on the same lines as they did a-quarter of a century ago; but clumsiness and weight are no proof of good work. I do not mean that the work should be flimsy; but with good, careful work great lightness and strength may also be combined. Of course work of this kind must necessarily be expensive; but the advantages to be gained make it worth while for the artist-photographer to pay for it. Our manufacturers have only to take the matter up in a proper spirit and it will become an accomplished fact. I hope some of them will see their way to providing an apparatus of this kind, for which I feel sure there would arise a good demand as soon as it became generally known.

I have merely indicated in this short communication what might be done with an apparatus of this description, but the field of its application is very wide. I trust these suggestions will bear some practical fruit, and that before long we may be able to obtain a portable and efficient pocket camera really worthy of the name.

LIME LIGHT.

By A. Philburn.

Most people have an exaggerated idea of the dangerous nature of the lime light; indeed, some there are who would not remain in the room where a mixed jet was being used, while others say thers is no safety even with the blow-through jet, Again: others say there is no more danger in using the lime light than there is in burning ordinary house gas (Mr. Viles, to wit).

The only two serious accidents that have come under my notice have been caused—not by the using of the gas, but in the making of it. The first was about eighteen years ago, when Mr. John Crouthers, of Peter-street, Manchester, had his head completely blown off, while his wife, who was in the same room at the time, was jammed under a chest of drawers not more than seven inches high, and so tightly, too, that before she could be released the drawers had to be lifted up. The second was the case of Mr. Wrench, Jun., of London, whose sad end is no doubt still fresh in the memory of many. In both cases mercury bottles were being used.

We have only to consider that house gas—which is most generally used in making the lime light—is not in itself explosive, but becomes so if mixed with a certain quantity of atmospheric air or oxygen in some form. Pure oxygen is non-combustible and non-explosive, therefore it follows that so long as the two gases are kept separate no danger need be feared; but they must be brought together to produce the result we require, viz., the lime light.

I will now proceed to consider how that may be done with safety. The blow-through jet may be considered absolutely safe, as the gases have no chance of mixing until they arrive at the point of ignition; but the light given by this jet is not nearly so good as that of the mixed jet, or that arrangement whereby the gases are allowed to mix just before ignition—by many called the "high-pressure" jet, although the pressure need not be at all great, as a column of water two feet high or about $\frac{8}{9}$ds of a pound per square inch is sufficient to produce the best results obtainable.

No reliance should be placed on the so-called "safety" appliances, such as stuffing a chamber full of wire gauze or of discs of perforated metal. They cannot be of any use whatever, but injurious, as they impede the free flow of the gases to the nipple, where the pressure should be maintained as high as possible. The jets I have most faith in are the simplest and cheapest, being made of quarter-inch brass tubing bent to a suitable angle, and brazed together as near the nipple as possible, forming at the point of juncture an inverted V. The cocks should have large "ways" through the "plugs," and should be fitted with good long handles so as to enable the operator to make the adjustments easily. With this kind of jet, and a certainty that there has been no previous admixture of the gases, I should feel as safe as I do in bed at night. The danger of making the oxygen will be reduced to a minimum by having the retort made of thin sheet iron about twenties gauge, eight inches in diameter at the bottom, eight inches high, and tapering to two and a-half inches at the top. It should have a good wide outlet and a large tube. A retort as above will make one and

a-half pound of chlorate into seven feet of gas, so it may be safely said there has been no waste *there.*

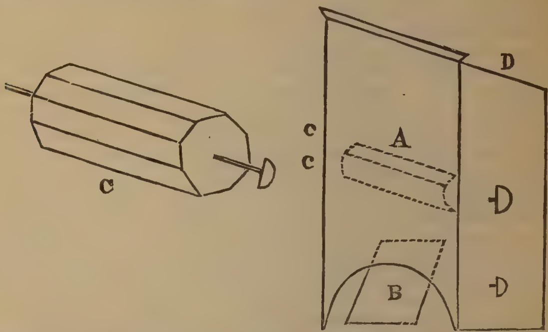
If you think there has been no waste *here* I shall be glad.

A PHOTO-CHROMOSCOPE.

By Jabez Francis.

The photo-chromoscope is a source of endless enjoyment for winter evenings, family parties, &c. It adds nature's tints to any photograph on glass. It may be easily constructed by any amateur, at a trifling cost, by following the instructions below.

A is a rectangular box of mahogany fifteen inches high in front, thirteen inches at back, seven inches wide, and six inches front to back. *b* is a silvered reflector (common looking-glass) placed at an angle of 45°, or may be mounted on a rod, with knob projecting as marked, when the angle can be varied. The glass should be six inches wide.



c, the drum, is made thus:—Take two pieces of mahogany three-eighths of an inch thick and five inches in diameter. Pierce a half-inch hole in the centre, and from this strike an octagon, cut to shape, and fix one on either end of a half-inch wooden rod six inches long having a small hole drilled up—say one inch. Take strips of coloured glass or gelatine—yellow, blue, mauve, rose tint, green, gold, red, and light blue—and cut about three-quarters of an inch wide, and glue them on the drum ends longitudinally, in the order indicated. They need not go close together. Let dry, trim the edges, and place in the centre of the box as indicated by the dotted lines, *c c*. Have two mahogany knobs with two inches of wire in, tapped about one inch up (these may be purchased at a furnishing ironmonger's for a few pence); pass these through holes at the side of the box into the wooden rod of the drum, and screw up nearly close. These knobs are for the purpose of turning the tinted drum.

At *d* fix a piece of finely-ground glass, to form a top to the instrument, which is now complete. To use it: place a glass stereo. in a stereoscope, stand the latter on the top of the *chromoscope* front of the instrument facing the light, and the reflector *b* will send the rays through

the tinted drum. These will be dispersed and harmonised on the ground-glass top, and the effect will be really beautiful.

A slight turn of the thumb-screw at the side, and the whole scene changes as if by magic. Moonlight effects are produced, changing again to early morning; the light creeps on, and ere long a succession of tints of lovely hue astonish and charm the beholder. No paint, no daub, to partially obliterate the picture, the details of which are preserved in all their purity, and their beauty is enhanced a hundredfold.

EMULSION APPLIANCES.

By Peter Tong.

In a demonstration I gave of the preparation of gelatine emulsion at the March meeting of the Bolton Photographic Society I exhibited and described the following pieces of apparatus for the mixing and washing of emulsion :—

The mixing arrangement I made for the boiling process given in The British Journal Photographic Almanac for 1880, page 200, in which, as the mixing takes place in a very weak solution of gelatine, a large excess of bromide has to be avoided, or the bromide of silver will be coarse.

I think the cause of irregularity in the sensitiveness and general character of different batches of gelatine emulsion (made from the same formula) may, to a great extent, be attributed to variations in the mixing of the bromide and silver with the gelatine, such as the speed of mixing and the relative excess as the mixing proceeds of the bromide to silver.

In this mixing apparatus the rate at which the salts are added is always constant, as well as the proportion of the one to the other, and as the salts are added to the gelatine in about their combining proportions the silver bromide is in a very fine state of division.

A and B, *fig.* 1, are two burettes, each of which is made by taking a piece of glass tube of half or three-quarters of an inch bore (drawn out smaller at one end, by preference), to which is fitted a piece of rubber tubing marked C in the diagram; to the other end of this rubber tubing a short piece of glass tubing a-quarter of an inch bore drawn out to a fine point or jet (marked G in *fig.* 2) is attached, having half an inch or more between the two glass tubes to allow a pinchcock, D, *fig.* 3, to pinch the rubber tube and prevent the solution flowing out except when released. The two small tubes G, *fig.* 2, are passed through a cork E, crossing one another, as shown in *fig.* 2, so that the solutions may flow into the Woulffe's bottle H (which has two necks) in two distinct, fine streams.

One of the tubes G may have a slightly-larger opening than the other, allowing the bromide to flow out quicker than the silver nitrate, thus preventing any possibility of there being an excess of nitrate of silver, which might combine with the gelatine and cause fog.

In using the apparatus pour the previously-warmed solution of gelatine into the Woulffe's bottle H, the bromide (also warmed) into one of the tubes A and B (that connected with the tube G having the largest outlet), and the warmed silver nitrate solution in the other. Release both the pinchcocks D with the left hand, and twist the long-

haired brush F round between the finger and thumb of the right hand, at the same time moving it rapidly up and down, which will tho-

FIG. 1.

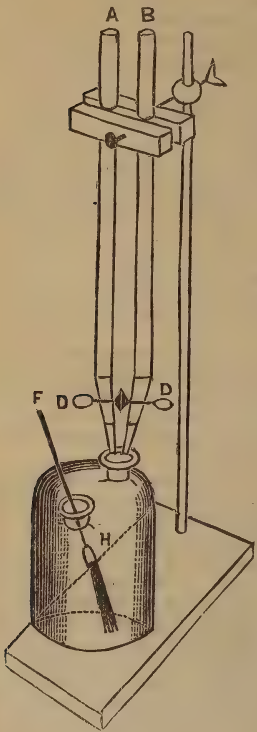


FIG. 2.

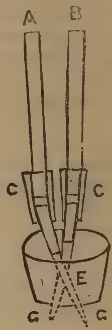


FIG. 3.

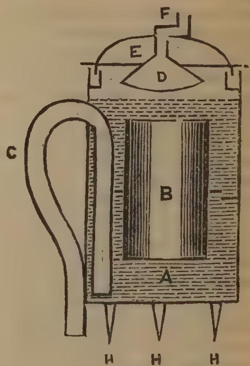


FIG. 4.

roughly whisk up the gelatine solution whilst the silver and bromide are added. The rest of the diagram will be readily understood, being simply an arrangement for holding the tubes, &c.

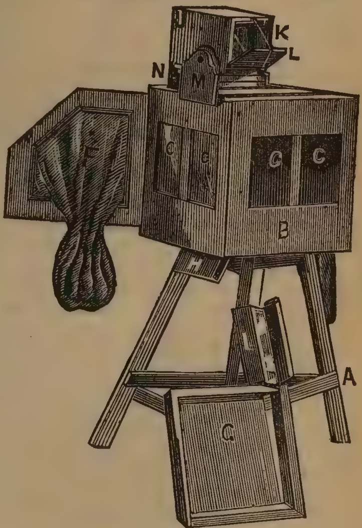
Washing Apparatus (fig 4).—A is a tin can (mine is ten inches deep and six inches diameter), with a light-tight lid E (the figure shows how the light is trapped). D is a rose made of block tin to prevent corrosion, soldered to a lead pipe F passing through the lid E, and connected with the water supply. The holes in the rose should be very small. B is a cylinder open at both ends, with a rim on each end to fasten a piece of muslin on. This cylinder has a flange outside in the centre of its length, which rests on three small brackets soldered in the can A. The whole of the tin, with

the exception of the rose, must have several coats of Brunswick black. To use: tie a piece of muslin on one end of B and put in the set emulsion (cut into squares of half-an-inch or less, or after being squeezed through coarse canvas into water). Cover the other end with muslin and tie it with a string. Place the cylinder in the can A, put on the lid, and turn on the water. When it reaches the bend of the lead syphon C the syphon commences to empty the water from A, which is again automatically filled and emptied as before. The bore of the syphon C should be at least twice that of the inlet F, which must not be more than a-quarter of an inch, or even less than that. H are three feet on which the can stands. After the lid E is put on the washing may be done in open daylight.

AN AMATEUR'S PORTABLE CAMERA AND OPERATING APPARATUS.

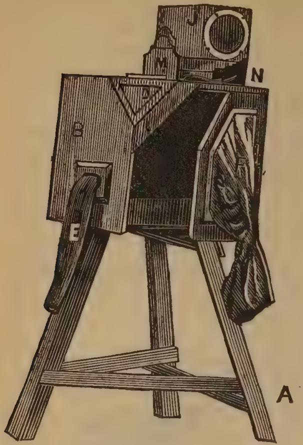
By James Harris.

In reply to the Editor's request for a contribution to The British Journal Photographic Almanac, I beg to introduce to its amateur readers the above apparatus, which has answered admirably in my hands. The diagrams show the four sides, A A, the stand, for home work, being twenty-four inches high, besides which I have a portable stand for taking views. B B represent two views of developing-box fifteen inches every way, outside measure. C C C C are four panes of orange glass in the sides—one pane in the bottom and another triangular pane at D, through which the operator looks. I have used the ordinary orange glass, and when working in the sunlight I make use of a thin, yellow shade.



A bag (E) is fixed into the side in order to use the plate-holder from the outside, and a sleeve (F F) is fixed into the door, through which the right arm works. G is a tray, with wooden sides, and a twenty-ounce glass bottom fits into the box to catch all the water, carrying a waste pipe through the bottom. H is a movable box, into which a half-plate bath fits, and behind which is fitted a small V-shaped box, I, to hold the blotting-paper, the cover of which falls back over the

bath. J J is the camera, suitable for 5 × 5 negatives, situated just over the bath, and is so constructed that the plate may be drawn up through a passage in a movable joint, which allows the front of the camera to be raised or lowered without fear of admitting any light. It is drawn up by means of a cord (K), to which a silver wire plate-holder no higher than the highest plate is attached, and when drawn up the focussing screen is allowed to spring forth, being previously held back by means of a cord fastened at both ends passing outside the door L, which is also glazed with orange glass.



The camera swings upon pivots through M M, and is kept up by means of the wedge N N, O being the place for the lens. Place an india-rubber tank upon the top of the box, and pass the tube with the tap to the inside. The chemicals are to be used from cups or small bottles poured from stock bottles. The camera, &c., may be taken off the top and the whole packed inside in about five minutes. I find this preferable to the ordinary dark room, everything being ready for outdoor as well as indoor work.

A CHEAP PNEUMATIC PLATE-HOLDER.

By L. MACDONA, B.A. (*Oxon.*)

A VERY serviceable pneumatic plate-holder can be made for a few pence by any one possessing a little mechanical skill.

At most turners or fancy article shops can be bought turned wooden egg cups, at one penny each. Choose one with the bottom slightly hollowed out, and bore a hole right through the stem, joining the two concavities. Now, from a piece of sheet rubber one-eighth of an inch thick cut out a disc slightly larger than the bottom of the egg cup, to form the "sucker." Tack this disc on to the bottom of the cup, using four small tacks, driving them in at the circumference of the hole in its stem. Now, with a red-hot iron wire, bore a hole in the centre of this disc to admit the air from the upper cup. It only remains now to saw a groove round the rim of the cup, and to tie or wire tightly over it a disc of thin rubber, such as is used for dropping bottles. Exhaust the air by pressing the top rubber, and see how a plate will stick! The octopus at the Aquarium won't be "in it!"

A HOME-MADE LANDSCAPE CAMERA.

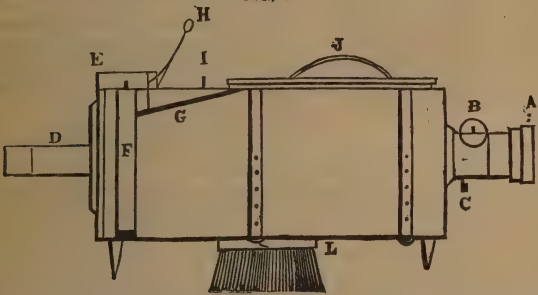
By JOSEPH H. WOODWORTH.

GIVEN: Possession of a bellows camera with *carte-de-visite* combination lens. Required: A suitable and portable arrangement for landscape work with as little expense as possible.

Having pretty fairly solved the foregoing problem and tested the working of the camera for the past two seasons, it has occurred to me that the readers of the ALMANAC might get a "wrinkle or two" from a short description of my arrangement.

The camera is rigid, of light wood, and screwed together light-tight. I "built" it to suit the focus of the front lens of my portrait combination reversed. I got a square plate made, into which screws the lens-holder, which is kept in place on the front of the camera by metal buttons. When packed for travelling the brasswork goes inside the camera, the lens being protected from injury by a metal cap screwed over it. In focussing I remove the stop from the lens, and get the view, thus well lighted, into position on the ground glass, and then, replacing the stop, button against the back a brass plate carrying the focussing glass and sharpen the portion of the view visible, thus dispensing with a cloth.

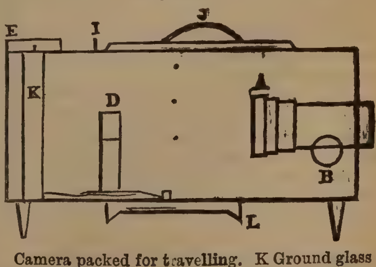
FIG. 1.



A Cap of lens. B Milled head of focussing screw. C Stop. D Focussing lens on plate. E Hinge of cover over dark slide, &c. F Dark slide. G Flap raised. H Cord and ring for raising flap. I Pin to keep flap raised. J Handle of carrying arrangement. L Tripod head and legs.

My double plate-holders are hinged near the top, and *open altogether inside the camera*, thus avoiding many risks from light, to which the usual forms of holders are liable. There are two small flat buttons at the bottom of each flap, keeping it light-tight, the inside edges being lined with leather. When placing the slide in the camera I open the buttons, keeping the plate-holder closed with my hand till in place, when I shut down on it a lid covering the aperture in which the focussing-glass or the dark slide is inserted. A piece of cord is attached to the flap and passes through a hole in the top front edge of the covering box, and when this cord is pulled it opens the flap of the dark slide

FIG. 2.



Camera packed for travelling. K Ground glass focussing plate.

up against the top of the camera inside. When released, the flap falls by its own weight, and is kept closed in withdrawing, by the finger and thumb, till secured by the buttons.

There is plenty of room inside for various appliances, such as note-book, spare focussing plate, &c. A leather handle secured by two straps forms a convenient means for carrying, and a round tripod head screws up against the bottom of the camera. The legs affixed to the camera give it rather a comical look, and have been the occasion of much anguish of mind to some of my æsthetic friends who go in for polished mahogany "fixins," &c.; but having had the article out on one of our excursions, when we were favoured with the "wet process" on a large scale, I had the satisfaction of seeing the rain running in torrents *under* my camera in the wagonette, and cheerfully soaking any appliances that rested on the floor of the vehicle. Possibly the rough sketches may make this rough article (no pun intended!) plainer to my readers.

I think the idea of opening the plate-holder inside the camera a good one. The cord is rather primitive, but other methods could be applied. Possibly a rod moved by a milled head and kept in position when the plate is exposed, by a spring catch, might be found to answer.

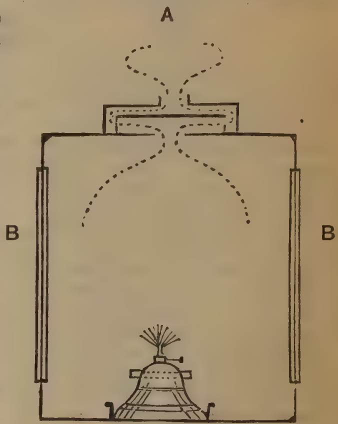
AN EFFICIENT LAMP FOR DRY-PLATE WORKERS.

By W. S. Downes.

As heretofore, it gives me great pleasure in sending my small contribution to the Almanac, trusting it may prove as efficient to the many as it has done to myself.

The chief recommendations of the lamp are that it costs but little and is perfectly light-tight, at the same time allowing a constant current of fresh air entering from the trap at the back, and passing out with the products of combustion at the trap on the top.

I hope that the sketches will be sufficiently lucid, and in connection with the following notes I think that any tinplate worker will be able to make one.



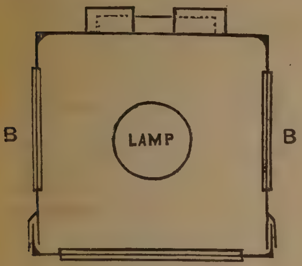
Section A B.

A The dotted lines show how the air, &c., escapes through the trap. B B Light. C C Traps.

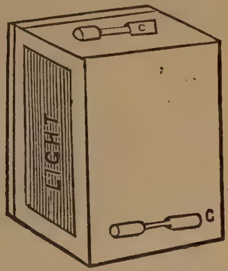
Mine is made of strong tin, black enamelled on the outside, and left bright and well polished on the inside for the purpose of reflecting more light from the lamp (one of the ordinary brass "Little Harry" night lamps). A rim is soldered to the bottom, into which the lamp securely fits. For the lights I have in the front and both sides two pieces of horn, slightly stained yellow in colour, and a piece of non-actinic oiled paper between them (for myself I prefer this yellow also)

fastened in a frame work of tin, and soldered in the openings of the same size to be made in the lamp.

The way the light-tight traps are made is first to cut a slit in the back near to the bottom and another in the centre of the top, and over each solder a piece of tin a little longer than the slit, bent half round and left open at the ends. Then another half-round piece of tin larger than the previous one, with one end stopped up, is soldered over each end of the first, leaving a clear space every way of one-eighth of



SECTION C D.



SKETCH, SHOWING ARRANGEMENT OF TRAPS, &c.

an inch for an air passage. I think a glance at the section will explain what I mean. I have indicated the way in which the air escapes by a dotted line.

To trim the lamp the front, which should be made to fit tightly, draws off. If the reader do not care to have a lamp specially made I may mention that one of Huntley and Palmer's glass front biscuit tins—with a hole $3\frac{1}{2} \times 1$ cut in the back near to the bottom and in the centre of the lid, with a light-tight trap soldered over each, and two thicknesses of orange paper (oiled) pasted over the front of the glass—makes as good and serviceable a lamp as anyone need wish to work with.

EPITOME OF PROGRESS DURING 1881.

By THE EDITOR.

TO REMOVE GREASE SPOTS FROM PHOTOGRAPHS.

IN the *Photographisches Wochenblatt* Herr Fr. Haugk describes what he calls an easy and sure method of removing greasy spots from photographs. He prepares a paste consisting of burnt magnesia, raw collodion, and acetone. The mixture does not require to be very accurately proportioned, but usually about equal volumes of each are taken and rubbed together until the consistency of rather a soft ointment is reached. The paste being prepared, a little of it is taken up on a paper knife and placed upon the greasy spot, where it is allowed to remain until all the volatile matter has evaporated. The powder left behind is then dusted off with a feather. If the spots have not entirely disappeared some more paste may be applied. Herr Haugk does not recommend the use of benzine for removing grease from photographs.

A TABLE FOR TESTING LIQUID AMMONIA.

The following table for testing the strength of liquid ammonia is given amongst the miscellaneous articles in the *Photographische Mittheilungen* :—Weigh an empty, dry 100 c.c. measure, and fill it with the ammonia to be tested, so that the under side of the concave plane of the fluid just reaches to the 100 stroke, and weigh it. According to the weight one finds the strength of ammonia by the table which applies to a temperature of 16° Cels. (12° R.) For higher temperatures it gives too high, and for lower temperatures too low, results. The numbers given, divided by 100, give the specific gravity. The *lighter* the ammonia the better it is :—

Weight in grammes per 100 c.c.	Strength.
90	26·5 per cent. of ammonia.
91	23·5 ,, ,,
91·3	22·6 ,, ,,
92	19·5 ,, ,,
92·25	18·6 ,, ,,
93·2	17·2 ,, ,,
94	14·86 ,, ,,
94·5	13·4 ,, ,,
95·17	12 ,, ,,
95·5	11·125 ,, ,,
96	9·75 ,, ,,
96·5	8·5 ,, ,,
97	7·07 ,, ,,

At a lower strength than this the ammonia is quite useless for purposes of development.

TO REMOVE A LENS FROM ITS MOUNT.

In reply to a correspondent in The British Journal of Photography, Mr. Baynham Jones, of Cheltenham, gives the following method for removing a lens which has become fixed in its mount :—The first is to cut a strip of leather, such as is used for straps, about half-an-inch wide and just long enough to encircle the lens, and put it in a vice. It will then come out readily with little chance of injuring the lens. The other is to turn a hole out of a half-inch board just large enough to take the lens mount, and cut it in two; place this also in a vice with the lens mount in it. This is, perhaps, the better plau.

A WORD ON DRYING-BOXES.

Mr. H. Y. E. Cotesworth, speaking on the subject of the imperfect action of drying-boxes, caused by want of a proper circulation of the air, throws out the following hints. He says :—The reason of this is not far to seek. Though much attention is paid to the means adopted to set up a current, not the slightest thought is given to the relative proportions of the inlet and outlet apertures of the drying-box. Thus it very probably occurs that a larger quantity of air finds its way into the box than can get out immediately, consequently a sluggish current results, and that only in certain portions of the interior—the air in the other parts (the corners and sides more especially) remaining almost stagnant and unchanged. If, however, matters be so arranged that the outlet is slightly larger than the inlet (I take as more specially applicable to my argument the form of box in which an induced current is used), and a sufficiently powerful current set up, the air that is drawn through the larger outlet will necessitate a more rapid current through the smaller inlet in order to replace it, and so a vigorous current is set up inside the box, and the whole of the atmospheric contents are in a state of rapid and constant change. By using suitable diaphragms to distribute the current over the whole of the interior, a drying-box which is as nearly as possible perfect is obtained.

THE PREVENTION OF FRILLING BY MEANS OF TANNIN.

In a paper read by Mr. Edward Brightman, before the Bristol and West of England Amateur Photographic Association, tannic acid was recommended instead of alum as a preventive against frilling. Writing a few weeks later on the subject of Mr. Brightman's paper, Mr. W. C. Williams gives the following directions for the use of the same substance:—Owing to the great expense of tannin as compared with that of alum, and coupled with the fact that the cheaper article invariably answers every purpose, I never use the former except when battling against very bad and persistent cases of frilling. I use—

Tannic acid	3 drachms.
Alum	3 ,,
Glycerine	1 ounce.
Water (hot)	8 ounces.

When cool is ready for use. I employ glycerine in all "soaking" solutions when used with the above. I believe it allows of more "rapid development" than if the alum and tannin were used alone, and permits of the films being more evenly developed through to the back. A hardened film always seems to possess a certain amount of veiling on the surface, or, to my thinking, "surface development;" but when glycerine is present I believe the developer penetrates the film more rapidly and tends to keep all shadows clear of veil, which is too often present when the development is prolonged, as it generally has to be with frilling plates, which usually rejoice in the name of "instantaneous." This means short exposure and long development. I may say that tannin does not, like alum, exercise any clearing properties.

TO ESTIMATE THE QUANTITY OF SOLUBLE BROMIDE IN EMULSION.

Mr. W. K. Burton recommends the following plan for estimating the excess of soluble bromide in gelatine emulsion:—A certain quantity of the emulsion to be experimented on—say an ounce—is carefully measured out. This is diluted with several times its bulk of hot water, so that it may not readily set again. A certain quantity of chromate of potassium solution is then poured into the emulsion. The exact amount does not matter. It should be sufficient to give the whole a very slight yellow tinge. A carefully-standardised solution of nitrate of silver in powder dropped from a graduated *burette* into the emulsion. At first, if there be any soluble bromide present, the red colour, which is produced by the formation of chromate of silver as each drop falls, will disappear on stirring the mixture. This is because the nitrate of silver has combined by preference with the soluble bromide; but when the whole of this latter has been used up the red colour will remain constant. The exact amount of nitrate of silver used when this occurs must be noted, and it is an easy matter to calculate how much soluble bromide was present when the operation began. If we refer to the tables given by Mr. William Ackland in The British Journal Photographic Almanac we may be saved all calculation. For example: on referring to these I find that the amount of ammonia bromide required to convert one grain of nitrate of silver is ·576 of a grain. I know, therefore, that if the bromide used to make the emulsion were ammonia bromide, for every grain of silver nitrate which was used before the red colour became constant there was ·576 of a grain of ammonia bromide present in the emulsion experimented on. The same method may be used for determining quantities of chlorides or iodides.

Should silver nitrate be in excess in the emulsion, this will be made evident by a deep red precipitate the moment the potassium chromate is added. Sufficient of this latter must be added to convert the whole of the nitrate of silver present, when its amount may be estimated by dropping into it a standardised solution of any soluble bromide till the red colour disappears. Very exact results may thus be obtained.

THE SOLUBILITY OF BROMIDE OF AMMONIUM.

In the course of a communication to the Vienna Academy of Sciences, Dr. Eder gives the following interesting figures in connection with the solubility of ammonium bromide. He says:—In dissolving bromide of ammonium in water a considerable lowering of temperature takes place. In dissolving twenty-five grammes of the salt in fifty grammes of water of 15·1° C. the temperature sank to = 1·1° C., the depression of temperature thus amounting to 16·2° C. At 100° C. bromide of ammonium only requires half as much water to dissolve it as it does at 10° C.

At a temperature of	10°	16°	30°	50°	100° C. respectively
one part of the salt requires to dissolve it the following parts of water:—	1·51	1·39	1·23	1·06	0·78

In strong alcohol (= 0·806) one part of bromide of ammonium dissolved at 15° C. in 32·3 parts of alcohol; while at boiling point only 9·5 parts of alcohol were required for its solution. Of ether (= 0·729) 890 parts were necessary to dissolve one part of bromide of ammonium.

Solutions of varying concentration of bromide of ammonium in water showed the following specific gravity:—

Percentage of bromide of ammonium in the solution	5	10	15	20	30	41·09
S.G. of solution at 15° C.	1·0326	1·0652	1·0960	1·1285	1·1921	1·2920

The solution which contained 41·09 per cent. of bromide of ammonium corresponded at 15° C. to saturated solution of bromide of ammonium in water.

A NEW APPLICATION OF THE "DUSTING-ON" PROCESS.

Mr. G. V. J. Poirin writes thus in The British Journal of Photography:—Comparative few people practise the "dusting-on" process. I think, however, that it is likely, for many reasons, to come greatly into use. I will refer only to one reason—that is, its adaptability to the bromide paper process. Take any paper print or collodion transfer and float it on a solution of bichromate of potash, dextrine, &c. (the usual formula); dry, and lay it in the printing-frame with its *back* to the light. The lights will not take the powder, but you can get any colour you like on the shadows. Bromide paper prints can be converted into carbon prints by this method. Nor is this all. By varying the pigment it would not be very difficult to *paint* a picture by this process, inasmuch as it would be possible to *paint* on the solution with a brush, and afterwards dust on the colour. The suggestion is ingenious, but much experiment will be needful to render the process practicable.

LUCKHARDT'S PROCESS OF PHOTO-ENGRAVING.

Herr Fritz Luckhardt thus describes a simple process of photo-engraving used by himself:—Being requested, at a few hours' notice, to draw a portrait for a circle of friends, I intended to use as a guide a photograph the printing of which was, however, delayed. The idea then occurred to me to coat the negative, which was at hand, with yellow varnish, and to etch the portrait with the needle on that ground. As I wished to make a caricature, the salient characteristics of the negative were retained as a foundation, the transparent parts etched out, and the clothing altered. In this way the photo-engraving was produced, the further use of which, I believe, is not to be under-valued. In view of the circumstance that the drawings and woodcuts of portraits which appear in the illustrated papers have frequently lost the likeness of persons whom they represent, and that notwithstanding they

are costly and require a long time to produce, would it not be advisable to use engraved photographs instead, even when the original negative, taken from nature, is not to be had, but only a negative reproduced from it? The yellow varnish—consisting of common negative varnish to which a suitable quantity of aniline yellow has been added until it has assumed a dark sherry colour—may be graved very well for a few days; but the older the varnish film the more brittle it becomes, and, therefore, a few drops of castor oil are added to it to render it elastic. The action of light upon sensitive paper placed beneath the negative is effectually suspended by the yellow varnish, so that only the transparent lines, produced by the graver, print. When once the principal lines of the original picture have been faithfully laid down, even an untaught draughtsman may produce an engraving of the portrait that shall at least have some resemblance; while a draughtsman skilled in cross-hatching or a xylographer should furnish a work which, placed beside a good woodcut, should exhibit a superiority recognisable even by the unprofessional eye. Besides the rapidity with which the engraving can be made the possibility of the utmost correctness is offered, since lines which have been too deeply graved or wrong lines may be filled up again with yellow varnish and engraved anew, a printing-frame and silvered paper offering a convenient method of watching and controlling the progress of the work. Where broken lines are desired a pencil may be passed over them, and then they may be pricked, and so on. By transfer paper an impression from an engraved, yellow-varnished negative plate may be transferred to zinc, and in this way a plate suitable for printing with the letterpress printing-press will be produced. A portrait of Dr. E. Hornig, engraved by this method, was issued with the *Photographische Correspondenz*, and was produced in one hour.

FERROUS OXALATE IN THE FIXING BATH.

A correspondent of The British Journal of Photography writes as follows on the addition of ferrous oxalate to the ordinary fixing solution:—I have been using for the last ten months the ferrous oxalate developer in the fixing bath, with good results. About one ounce of old ferrous oxalate developer is added to a pint of hypo. solution, and the plate allowed to remain in about ten minutes or less. This gives very brilliant negatives. Try it.

A COLLO-RESTRAINER FOR ALKALINE DEVELOPMENT.

Writing on the subject of alkaline development, Colonel Stuart Wortley speaks thus of a preparation he invariably uses in the development of gelatine plates:—On my voyage abroad I took with me this restrainer mixed in various proportions, and have finally, having carefully noted its keeping and other qualities, settled down to the following formula:—

Gelatine .... 3 drachms.

Soak in water twenty-four hours. Drain water off thoroughly, and add—

Sulphuric acid.................................... 7 drachms.

When cold add water seven ounces. Neutralise with liquor ammonia (it will take about two ounces), then add—

Glycerine .... 4½ ounces.

In my original formula of 1875 I used three ounces of glycerine to 320 grains of gelatine; but on the whole the formula now given is preferable. Using this to replace all but a mere trace of bromide, a great advantage will be found.

ENGLAND'S METHOD OF REDUCING OVER-PRINTED PROOFS

The following communication was made to the *Journal of the Photographic Society*, by Mr. William England:—A simple and certain method of reducing over-printed proofs has been one of the wants long felt by all photographers. It is well known that in every photographic establishment even the most careful printers cannot always be sure of getting the exact depth of tone

required, and proofs occasionally get over-printed. Of course "prevention is better than cure;" but, when a remedy is necessary, the method I am about to describe answers admirably. I tried a great many experiments before I succeeded to my satisfaction. I found that cyanide of potassium totally destroyed the print, even when used moderately strong. By using a weaker solution it was well under control, and the exact depth could be readily obtained; but during the washing to remove the cyanide the action of the latter continued, and spoiled every proof. I then tried several methods to arrest the action of the cyanide, but without success. It then occurred to me to use the cyanide in such a weak state that but little should be held in the paper—only sufficient to reduce the print to the required depth; for this purpose I made a bath of only four drops of saturated solution of cyanide to a pint of water. The prints immersed at first showed no signs of getting lighter, but after about an hour the most perfect results had been obtained with prints considerably over-printed. With lighter pictures a less time is required. Proofs treated in this way lose nothing of their tone during the after-washing, which should be thoroughly done, and, when dry, retain all the brilliancy of an ordinary print. I enclose you a proof, one half treated in the way described.

REDUCING THE DENSITY OF GELATINE NEGATIVES.

Referring to an article which appeared in last year's Almanac, Mr. Alexander Cowan says:—Foremost amongst the many valuable hints in this year's Almanac certainly stands the method introduced by Mr. W. E. Debenham of reducing the density of gelatine negatives by the application of "Holmes's ozone bleach." After a number of experiments on various negatives—some recently developed and others many months' old—the writer comes to the conclusion that its merits are in no way overrated. Perhaps the record of the way in which the negatives sent herewith were treated may induce others to give the "bleach" a fair trial, and let their photographic brethren have the benefit of their experience with it. The three negatives were exposed for exactly the same time and developed together up to fair printing density. Two of them were now taken out, and the development of the third continued until it had gained considerably more than double the density of the others. They were then all fixed and soaked after washing in a saturated solution of alum for fifteen minutes. After washing No. 1 was set away to dry. No. 2 was treated with the "bleach," diluted with three parts of water, which soon reduced the density considerably, but quite evenly throughout—not attacking the shadows unduly, but reducing the image all over alike. No. 3 (the over-developed one) was then treated in the same way with the dilute solution, and afterwards with the concentrated solution as sold, until the image was reduced to less than half the intensity of the less-developed one, and yet the detail in the shadows has not been lost. The action of the solution seems to be that it partially softens the film throughout, and takes off a thin layer of the gelatine all over the plate. The action can be much accelerated by gently rubbing with the finger any parts that it may be required to *locally* reduce, having a copious stream of water at hand to at once arrest the action if it proceed too rapidly. In fact, it seems to be a very ready means of *locally* reducing density in default of a reliable method of *locally* increasing it.

Writing at a later date, Mr. W. C. Williams recommends for the same purpose a saturated solution of alum in combination with Condy's fluid, as being more easily obtained than the ozone bleach. His directions are as follow:—My reducer can be obtained at any chemist's in the kingdom, and is composed as follows:—

Condy's fluid (green)	½ drachm.
Saturated solution of alum	4 ounces.

The red fluid will do as well; but it costs a shilling, the *green* only sixpence, a bottle. Drop the Condy's fluid into the alum solution; it will immediately clot and change from a dirty green colour to a rich claret. Upon stirring this the clots dissolve, and the fluid becomes a beautifully-transparent magenta, or crimson if made strong enough. Place the negative in this, and keep rocking to prevent uneven action or deposit of any kind forming; and to render the action even I think it as well to first soak the negative in dilute alcohol. This reducer does not appear to remove the dye from pyro.-developed films. The alum I use to prevent frilling, as there would be a tendency that way if it were absent. I am thankful to say I have not had much experience with dense negatives, and therefore not much with this reducer; hence I can only say that in my hands it acted well and very rapidly. Its action is very energetic, and this accounts for its being used in so small a proportion as half-a-drachm to four ounces. Perhaps some of your many readers will give it a fair trial and report thereon. Allow me to tender my thanks to Mr. Debenham for his reducer, which I mean to try at the earliest possible opportunity.

For the same purpose Mr. L. Warnerke recommends a solution of persulphate of iron, which acts as a powerful solvent of metallic silver.

RESORCIN AS AN ANTISEPTIC.

In a communication to the South London Photographic Society Mr. Leon Warnerke recommends resorcin as a useful antiseptic for photographic purposes, having tried it both with albumen solution and with gelatine emulsion. He gives the following particulars with regard to its preparation and properties:—Resorcin is the substance first obtained by Hlasiweth and Barth by the action of caustic potash on gum galbanum in the state of fusion. Its chemical formula is $C_6\ H_6\ O_2$; it is isomeric with pyro-catechine and our old acquaintance, hydrokinone. To prepare it, gum galbanum is first treated with alcohol to eliminate all parts soluble in that menstruum. Subsequently two and a-half to three parts of caustic potash are added, and the mixture heated till a homogeneous molten mass results. Sulphuric acid with water is added. From two to three parts of ether are mixed, and all resorcin is dissolved. It is next subjected to evaporation on a water bath, the residue distilled, when resorcin in the shape of crystals is collected. From thirty grammes of gum galbanum one gramme of resorcin is generally obtained. Gums of assafœtida, ammoniac, sagapénum, acaroïde, extract of the wood of sagan, and parazodophinol equally furnish resorcin. Resorcin melts at 90°-104° Cent., and boils at 270°. It is neutral and has a disagreeable bitter and sweet taste; it is very soluble in water, alcohol, and ether, but insoluble in bisulphide of carbon and chloroform. It combines with ammonia, sulphuric acid, and sulphate of aurine. When heated to 195° with phtalique anhydride it gives fluorescin. Treated with nitric acid it gives trinitroresarch, or acid stiphinique, $C_2\ H\ (No_2)_3\ (OH)_2$, which is far more explosive than the compound picric acid.

A CONVENIENT MODE OF CLOSING OR "CAPSULING" BOTTLES.

We are indebted to Mr. Warnerke for a very perfect and convenient mode of hermetically closing bottles or other vessels containing chemical compounds. The plan consists simply in rapidly dipping the neck of the bottle in molten Spence's metal. This valuable compound, previously described by Mr. Warnerke, possesses the following useful properties:—It melts at a low temperature, it solidifies very rapidly, and it is not affected by any chemicals (carbon bisulphide excepted). When solid it is extremely hard and brittle. All these properties render it perfectly suitable for the purpose proposed. To illustrate the extraordinary capabilities of this method a test-tube was filled with collodion, and then the orifice of the tube was covered with cigarette paper

stuck to the edges of the tube by moisture; this was rapidly plunged in Spence's metal, and, notwithstanding the porous nature of the paper and volatility of the ether, the tube was effectually closed. Opening of the bottles thus sealed is not difficult, thanks to the brittleness of the metal. Spence's metal is a compound of sulphide of iron with sulphur; it can be molten in an ordinary saucepan over a slow fire, only care must be taken not to heat it too much, because it thickens with a high temperature. If by chance this happen the saucepan must be removed from the fire and cooled until the molten mass becomes perfectly fluid again.

REMOVING STAINS FROM GELATINE NEGATIVES.

The following formulæ have been published for removing from the shadows of gelatine negatives the objectionable yellow or brown stain caused by prolonged contact with the discoloured pyro, solution. The first was intoduced by Mr. W. Hanson, who says:—The remedy I have used is cheap, effective, and, above all, free from the objections that apply to other means I have seen proposed to effect the same end. *Chloralum* is the agent I can now with confidence recommend for removing every kind of stain—red, green, or yellow—from gelatine negatives, having used it with the most perfect success for several months. Chloralum does in a few minutes all that alum can do in hours of time; but I need not compare my new remedy with older ones, as a single trial will convince any one that chloralum is a most useful agent for the purpose named. I may just add the caution that chloralum reduces the strength of gelatine negatives, and it is a good agent for so doing when required. I may also say that it can be obtained at any druggist's establishment, and used as a bath for a very large number of plates. I prefer it diluted with half its bulk of water, though it may be used stronger or weaker according to what is required of it.

A "Practical Photographer" subsequently corroborated Mr. Hanson's recommendation in these words:—Diluted with half its bulk of water, as recommended in The British Journal of Photography, chloralum acts steadily in the removal of the fog, and, in a few minutes, a clear, shadowed negative, with a nice, pinky-coloured image lies before the photographer and proves excellent in printing quality. With a thin negative it might be wise to increase the bulk of water, as Mr. Hanson suggests, as otherwise an undesirable reduction might take place.

We have next Mr. J. Cowell's plan, consisting in the application of a solution of alum and citric acid, the following being his formulæ:—Make a solution of—

1.

Citric acid	2 ounces,
Water	10 „

and one of—

Alum	2 ounces.
Water	20 „

These can be kept in separate bottles, and, when wanted, mix five ounces of the former with ten ounces of the latter. Immerse the plate in this for a few minutes, and take—

2.

Citric acid	2 ounces.
Alum	1 ounce.
Water	10 ounces.

The negative after treating with either of these solutions becomes perfectly clear in the shadows provided no "light fog" be present, and closely resembles a wet plate.

Mr. A. L. Henderson prefers to substitute hydrochloric acid for the citric, in the proportion of one ounce of acid to one pint of saturated solution of

alum; the whole may also be saturated with boracic acid, though the advantage of the latter is not very evident.

Mr. H. Y. E. Cotesworth prefers hydrochloric to citric acid, for the following reasons. He says:—I have used both citric and hydrochloric acids in conjunction with alum, and as far as their clearing action is concerned one is as good as the other, but the citric is many times more expensive. It has been said—by Mr. Cowell, I believe—that the hydrochloric acid ruins the negative by its energetic reducing action upon the image itself. This is quite an error; let him try it. The clearing action is nearly instantaneous, and I have tried the experiment of washing a negative after the yellow stain has been removed (when, of course, a great difference occurs), and then immersing a *portion* of it for *four* hours in a newly-prepared solution of alum (saturated) with the proportion of hydrochloric acid recommended by the Editors (1:20). At the end of that time no difference was noticeable between the two halves. Another reason (besides its cheapness and the rapidity of its action) why I prefer hydrochloric acid is that in using it after silver intensification it will destroy any chemical compound formed by the action of the silver on the gelatine. Ag Cl may be thus formed, but in such small quantity as to be entirely harmless. One word of caution I would give: let the solution be used fresh—not over and over again.

A CHEAP RUBY MEDIUM.

Mr. W. K. Burton describes in the course of an article in the Journal the following method of producing a cheap and effective medium for dark-room windows:—The colour of silver chromate is exceedingly intense. So intense is it that if an emulsion containing only three or four grains of the chromate to the ounce, and taking only four or five grains of the nitrate of silver to its composition, be spread on glass the result is a deep ruby film, which would, I believe, be very useful as a non-actinic medium. The amount of silver required is so small that this makes a very cheap coating. The emulsion may be made as follows:—

Solution No. 1.

Gelatine	100 grains.
Water	4 ounces.
Bichromate of potassium	20 grains.

Solution No. 2.

Nitrate of silver	20 grains.
Water	1 ounce.

Soften the gelatine in the water, add the bichromate of potassium, and heat till the gelatine is melted and the bichromate dissolved; then add solution No. 2. This gives a considerable excess of bichromate, and I do not see that it is either necessary or desirable to wash this out.

GELATINO-BROMIDE AND GELATINO-CHLORIDE PAPER.

The following formulæ and working details are given by Mr. W. T. Wilkinson:—

Gelatino-Bromide Paper.

Emulsion.

Potassium bromide	400 grains.
Ammonium iodide	80 ,,
Gelatine (Cox's)	2000 ,,
Water	10 ounces.

Dissolve the salts in the water; then the gelatine (after soaking) by the aid of gentle heat. When completely dissolved churn with an American egg-beater until thoroughly fluid, and allow to set. This part of the process is best done over night, so that the jelly may have ample time to settle and solidify after churning. In the meantime dissolve 680 grains of silver nitrate

in five ounces of water. To emulsify: scald the froth off the bromo-iodised jelly, cut it into small pieces, and re-melt; now have the silver nitrate solution warmed to about the same temperature as the gelatine solution, and proceed to emulsify by gradually adding the silver a little at a time, stirring thoroughly with a glass rod between each addition and during the time of addition. When all has been added place the jar containing the emulsion in a water bath, and keep it at a temperature of (say) 150° for about an hour; then add one drachm of ammonia, and, after using the stirring-rod vigorously, return again to the water bath for about fifteen minutes, when the emulsion may be poured into a dish and allowed to set. The emulsion may now be washed, redissolved, and made up to twenty or twenty-five ounces (according to the nature of the gelatine used) by the addition of equal parts of alcohol and water. The emulsion being made, the next operation is to coat the paper. This is accomplished either by pouring the emulsion into a porcelain or glass tray standing in a larger tray of hot water to keep the gelatine fluid; or, for coating large surfaces with small quantites of emulsion, one of the long, narrow, enamelled iron troughs sold by most ironmongers may be used, this also being placed in hot water. The vessel being chosen and the emulsion filtered and poured out, take the sheet of paper and carefully roll it, *face outwards;* place the edge upon the emulsion, seize the two corners, and slowly draw the surface over the emulsion, when the sheet will unrol itself, and upon holding it up it will be seen that a beautiful, thin film of gelatine has attached itself to the paper, which may now be hung up to dry, and the operation repeated with another roll. This method of coating the paper is practically the same as that used for making carbon tissue, and must not be done too rapidly, but the paper drawn over the surface of the gelatine slowly and steadily. When the paper is dry it is ready for exposure, which may be effected either in the enlarging camera or printing-frame. The image may be developed by means of the ferrous oxalate solution advocated by Mr. F. York in a previous ALMANAC. For prints from thin, delicate negatives this developer may be diluted as follows:—

Saturated solution of sulphate of iron	1 ounce,
Saturated solution of oxalate of potash............	3 ounces,
Water	2 ,,

and, when necessary, three to five grains of bromide added. The proof may be developed either by floating or immersion; but floating, if carefully done, is the better mode. After development wash thoroughly and immerse in alum solution; then fix in clean hypo., wash well, and again immerse in alum to guard against yellowness in the whites or the retention of hypo. in the film and paper. For negatives pyrogallic development may be employed; but great care must be exercised to guard against yellow stains by the use of dilute solutions and the presence of plenty of bromide.

GELATINO-CHLORIDE PAPER.

The paper is prepared in the same way as the gelatino-bromide paper, with the exception that the emulsion is compounded with 2440 grains of chloride of barium and 1700 grains of nitrate of silver instead of the bromide and iodide then given, the rest of the manipulations being the same. Paper so prepared is much more sensitive than albumenised paper, prints with all conceivable vigour and delicacy, and requires little, if any, extra depth to be allowed for in toning and fixing. The toning may be effected in any favourite bath, but must be judged by looking through the image—not upon it. After a change or two of water, fix in hypo. two ounces, water one pint, immersing ten minutes. After fixing, wash in ten or twelve changes of water, and immerse in alum five ounces, water twenty ounces, for five minutes; then again wash, and the prints are ready for drying and mounting. Care must be taken not to use warm water in any of the stages of the process, or else the chances are the image will go; also, in burnishing gelatine prints they

must be thoroughly dry before passing through the burnisher. Since the foregoing was written I find it is of great advantage to use, before toning, a weak solution of alum. After taking the print from the frame immerse in clean water, then in alum one part, water twenty parts, again in clean water, and from thence in the toning bath. In addition to chloride of gold toning bath, platinum answers well and is a little less costly than gold, as it goes farther.

THE FERROTYPE PROCESS.

The following formulæ for the ferrotype process are taken from an article by Mr. W. Heighway:—

The Sensitising Bath.

The greatest importance is to be attached to purity as well when in use, to prevent its contamination by deleterious substances, as to secure its freedom from all foreign matter in making it up.

Formula.

Silver nitrate, recrystallised	1 ounce.
Distilled water	10 ounces.

Iodise with potassium iodide, and acidify with nitric acid. Dissolve the silver nitrate in the distilled water. Take one-half the solution and add a few grains of potassium iodide; the solution should be saturated—*i.e.*, incapable of dissolving more of the iodide. Filter quite clear and add to the uniodised portion.

The Collodion.

Cadmium iodide	5 grains.
Ammonium iodide	7 ,,
Cadmium bromide	4 ,,
Cotton	12 to 14 ,,
Alcohol	1 ounce.
Ether	1 ,,

The Developer.

Ferrous sulphate	1 ounce.
Water (ordinary)	16 ounces.
Acetic acid	1 ounce.

The Varnish.

Take a quantity of fine bleached shellac which has been perfectly dried, and break it up into small pieces. Put these into a bottle containing absolute alcohol. Cork the bottle, shake well for some time, and set by. This may be used as a stock bottle, and replenished as required with shellac and alcohol. When required for use decant the supernatant liquid into a clean bottle, and dilute (if necessary) with alcohol.

AN EASY WAY TO COAT GELATINE PLATES.

The Rev. H. B. Hare writes on the above subject:—Perhaps some of my brother amateurs will be glad to hear of an easy and effectual method of performing this operation. Having tried several plans suggested by different writers in the Journal and Almanac, with more or less success, I at last hit upon a "dodge" which seems to answer the purpose well. It is as follows:—Slightly warm your clean plates on a flat hot water tin; then, having placed one on a pneumatic holder, dip a broad, flat, *clean* brush into the gelatine emulsion, and quickly rub it over the whole surface of the plate. You can now pour on the emulsion quite as easily as collodion. Rock the plate for a minute or so, place it on a perfectly level piece of marble, slate, or glass, and leave it to set. A very little practice will soon enable the operator to ascertain the exact quantity to remain on the plate; suffice it to say, it must be drained very slightly. I use a baby's food-warmer (shielded from all white light by a covering of red cloth) both as a pouring vessel and also for dipping the brush. The *tin* part of the brush should be varnished over with black varnish to prevent any contamination of the emulsion.

THE SOLUBILITY OF PROTOSULPHATE OF IRON.

The solubility of sulphate of iron is represented in a singularly variable light, some authors giving tables remarkably different from others. Perhaps the following, which is on the authority of Herren Brander and Firnhaber, may be considered as nearly correct as possible:—

Temperature in Degrees Centigrade.	Quantity of Water required to Dissolve One Part.
10	1·64
14	1·43
25	0·87
32·5	0·66
46	0·44
60	0·38
84	0·37
90	0·27
100	0·30

It will thus be observed that a singular property is shown to be possessed by this salt, its solubility increasing till it reaches within some little distance —10° Centigrade—of the boiling point, when it quickly begins to get less soluble, so that a solution saturated by treatment at 90° over an excess of crystals will be found to have a crust upon its surface when raised to boiling point.

A GELATINO-ALKALINE DEVELOPER.

Mr. George Mansfield, following out the line of experiment detailed in last year's Almanac by Dr. Kemp, gives the following formula for a gelatino-alkaline developer:—The following is the formula which has succeeded in my hands:—

Nelson's amber gelatine	1 ounce.
Water	2 ounces.

Let the gelatine thoroughly swell, and then dissolve in a water bath. When boiling add, little by little, half-an-ounce of a saturated solution of caustic soda; continue boiling until there is a flocculent precipitate, let cool, and filter. To make a developer: one drachm of the foregoing solution should be added to every ounce of pyrogallic solution, which may be from two to three grains to the ounce. I used Nelson's amber gelatine because I had it at hand. Others might be as good or better; perhaps, indeed, it would be worth trying glue or some of the coarser gelatines. I cannot say anything as yet about the keeping quality of the solution; but that could, probably, be easily secured by the addition of a few drachms of alcohol. I think that by modifying the formula the restraining properties of the solution might be utilised in the ferrous oxalate development. For that purpose I would substitute caustic potash for soda, and afterwards neutralise with oxalic acid, and add to the ferrons oxalate developer instead of restraining bromide; but I only give this as a suggestion, not having had time to try it.

TONING CARBON LANTERN TRANSPARENCIES.

In a leading article in The British Journal of Photography on the above subject, the following remarks occur:—If it be desired to tone a carbon picture (whether it be a glass transparency or a paper print) to a warmer shade nothing is more simple when alizarine forms part of the colouring matter, as it is only necessary to treat it with any weak alkali, such as ammonia potash or soda. The best to use in practice is the carbonate of soda, because it does not affect the gelatine in the same manner as ammonia or potash is liable to do. An immersion in a ten-grain solution will quickly change the tint to a much warmer one, by increasing the redness of the alizarine. The following plan has been highly recommended for toning transparencies, and it gives a rich brown colour without affecting the pigment of which they are

composed, as in the case with the permanganate:—The picture is immersed in a one-per-cent. solution of nitrate of silver until the film is well permeated; it is then rinsed under the tap and flooded with the ordinary pyrogallic acid intensifying solution, to which a few drops of nitrate of silver solution has been added. This is flowed backwards and forwards as if intensifying a negative until the desired tone is obtained. By using the solutions dilute a rich brown tone may be obtained without materially adding to the intensity of the image. After toning by this method it is desirable to flood the plate either with a solution of hyposulphite of soda or dilute cyanide of potassium to prevent further action, especially if the pictures are to be exposed to a strong light. By taking advantage of the method of precipitating a colouring matter in the film by double decomposition, as is done in the process of dyeing, almost any colour or tint may be produced *plus* the colour already in the film, provided that colour is unaffected by the reagents. This it generally is by those it is most desirable to use. As an example: if a carbon transparency be immersed in a solution of iodide of potassium, rinsed—as in the case with the silver method—and afterwards flooded with a solution of bichloride of mercury, iodide of mercury will be precipitated in the film, giving it a light red colour. A greenish-blue (which may be very useful for marine or moonlight subjects) is obtained by first immersing the picture in a dilute solution of protosulphate of iron, and, after washing, flowing over it a solution of ferrocyanide of potassium, which will form Prussian blue. A yellow (more or less bright) suitable for sunset effect may be produced by first treating the slide with bichromate of potash solution, and then with one of acetate of lead. The result of this treatment is the production of the yellow chromate of lead. From the above few examples it will be seen that almost any tint may be produced, as we have before said, *plus* the original colour of the tissue. Black tones—which are far the most useful for general purposes—can be obtained by the action of the salts of iron on an infusion of nut-galls, logwood, gallic acid, &c. The following will give a rich, velvety, purple black, which is exceedingly pleasing:—First immerse the plate in a one-per-cent. solution of perchloride of iron, and after well rinsing the surface pour over it a two-grain solution of gallic acid until the desired result is obtained. By varying the salt of iron, and for the gallic acid substituting pyrogallic acid, infusion of nut-galls, logwood, &c., a great variation in the tones may be produced. In the event of the tint obtained not being satisfactory it may be quickly removed by flowing over the plate a little very dilute hydrochloric acid (say thirty minims to an ounce of water), and, after washing, the operation of toning may be commenced afresh in any other way. Whichever method of toning be employed it will always be advantageous to use the solutions very dilute, as, in the event of the first application being iusufficient, it may be repeated and the effect increased, whereas if they are strong the deposit will render the shadows too dense for lantern purposes. Care must always be taken to wash the *surface* of the film free from the first solution before the second is applied, otherwise surface stains will be produced. The transparency of the shadows may often be much improved by varnishiug the picture with a colourless negative varnish. It may happen, if the transparency have been allowed to dry before intensifying, that the film may appear greasy and repellent. This may be overcome by rubbing its surface with a tuft of cotton wool moistened with dilute ammonia, which will have the double effect of removing the greasiness and rendering the film more easily penetrable by the solutions.

Writing on the same subject, Mr. H. Y. E. Cotesworth says:—Of the iron salts I have confined myself to two oniy—the sulphate and the chloride. One experiment made with the oxalate (in the form of ferrous oxalate developer) showed no special features to recommend it in preference to the simpler form. Of the two named I prefer the second, which I employ in the form of the officinal tincture—the *tinctura ferri perchlor* of the *Pharmacopœia*.

This, diluted with from twelve to twenty times its bulk of water, forms a convenient strength for general use. If a stronger solution be necessary—where an accession of density is desirable as well as change of tone—the sulphate should be employed, as a more concentrated solution can be used without producing irregularities, the alcohol of the tincture somewhat limiting the applicability of the latter. The tones produced by the chloride are, I think, brighter and the shadows clearer than when the sulphate is used. For the mordaunt pyrogallic, gallic, tannic, or salicylic acids may be used, but I prefer them in the order named. Pyro. gives a warm, purple-black tone, gallic a colder, and tannin a still colder purple. Salicylic acid gives a splendid crimson purple—too warm for most purposes, but useful in counteracting a too cold tone. Owing to its low degree of solubility in cold water it will be necessary to employ it warm with the addition of as much methylated spirit as the film will bear without irregularity. Chloride of gold may be substituted for the iron salt, and the same mordaunts used (or a salt of tin) as I have suggested, or the gold may be followed by the iron as a mordaunt. The tones are, however, not so generally satisfactory as with iron and pyro.; still, where variety is desired, it may be thus obtained. Before proceeding to tone 1 prefer to allow the developed print to dry thoroughly; it is then immersed in the iron solution, which it absorbs for a minute or two, when, after a surface rinse, the mordaunt in weak solution is poured on and off until the desired tone is reached.

MODERN VARIATIONS IN ALKALINE DEVELOPMENT.

Considerable attention has been given, during the past year, to the subject of alkaline development as applied to gelatine plates, and numerous modifications have been recommended, many of them very opposite in their nature, yet all of them, perhaps, well suited to some particular description of plates. The following are the principal formulæ in their order of date:—

Mr. William Brooks's Method.—Soak the plate in a solution of bromide of potassium and ammonia first; allow it to soak in for about one minute; place some pyrogallic acid in the developing-glass, pour back the pyrogallic solution into the glass, and see that it is all dissolved (if not dissolved intense spots will occur and spoil the plate). Now, as soon as it is poured over the plate, if the exposure be about nearly right the image appears at once, and the requisite density is soon obtained, while there is not that sinking-in effect often seen when a plate takes a long time to develope. As I have said, it seems to me that this last method is by far the best, and I look at it in this way:—It is well known that the gelatine emulsion is put upon the plate so as to give a very dense film, and so that the light of the image shall not pass through it and cause blurring. By applying the ammonia and bromide solution first the plate becomes perfectly saturated with it, and becomes thereby in a very excited condition. As soon as the pyro. is added the image at once makes its appearance with plenty of vigour. As in a thickly-coated plate, the side of the film next the glass does not go to form the image, as it is the outside surface only that goes to form the image, and the pyro. applied in this way forms the image at once before it has time to penetrate the film and cause fog. I have always found that a plate which takes a long time to develope is never so bright and good as one that has been quickly developed, and there is far less chance of getting yellow fog. By the following formula I have been able to develope nearly all makes of plates in the market successfully:—

Liquor ammonia	1 ounce.
Bromide of potassium	1 drachm.
Water	2 ounces.

This keeps any length of time in a well-stoppered botttle. For (say) a $7\frac{1}{4} \times 4\frac{1}{2}$ plate I put about five to ten drops of the above into a clean measure, and four ounces of water, pouring it over the plate, and then add

pyro., as I have described above, about three grains to the ounce. If the subject be flat and wanting in contrast I increase it to six grains and sometimes more.

Colonel Stuart Wortley says:—Some of the best of my negatives have been developed with ten minims of strong ammonia and one and a-half grain of bromide; but the plate must be a well-prepared one to stand this development. What every plate *ought* to stand without showing a trace of fog is, I think, the following standard developer:—

Liquid ammonia, ·880	2 minims.
Bromide of potassium	¼ grain.
Pyro.	2 grains.

I think this a good test developer, though I know of more than one kind of plate that will not bear this proportion of ammonia to bromide satisfactorily, while others will bear five minims of ammonia to the quarter-grain of bromide. As to the quality of the pyro.: I believe I was the first to point out its great effect on the *density* of the negative. In fact, I consider development a science; and, while I believe it to be comparatively easy to make a good plate, it is less easy to thoroughly master the best development for all different kinds of subject. In speaking this way, mind, I mean getting fine negatives—not mere images on the glass, dense or thin, as may be. Now there is the question: Shall we add all the constituents of the developer together, or one before the other? * * * * *
If we put ammonia—say one minim to three ounces of water—on first by itself we gain a distinct advantage and greatly reduce the exposure, though it is not every make of plate that will bear this treatment. If the plate will hardly bear this then put a few drops of the glycerine and gelatine solution with the ammonia, and you get a sufficient restraint. Where you suspect much *over*-exposure, put the pyro. and bromide on together first, but never bromide *alone*, as it destroys the power of bringing detail out in the shadows. One or two useful facts as to keeping qualities of certain solutions:—Pyro. dissolved in *pure* alcohol (anhydrous), containing one grain of thymol per ounce, in December, 1879, is now, after going round the world, as good for developing as new pyro. Also pyro. dissolved in a one-grain solution of salicylic acid in water, at the same time, is still as fit for use as ever. It was worth while making that journey to become thoroughly satisfied as to what plates and what solutions will *keep*, and which will not.

In a later communication Colonel Wortley says:—I may strongly urge on you to try *salicylic* acid in the pyro., thus:—

Salicylic acid	10 grains.
Pyrogallic acid	100 ,,
Water	20 ounces.

This keeps in good order for any time—at least, I have some that has been mixed for two years still unchanged. (The salicylic acid may require to be dissolved in *hot* water.) This acid has one notable advantage—it assists brilliancy of negative, and is a great preventive of staining. Where economy of space is necessary then dissolve the pyro. in alcohol, adding one grain of thymol per ounce.

Mr. W. E. Debenham's Formula.—In an editorial article in The British Journal of Photography the following remarks are made with regard to a formula given by Mr. Debenham:—In the course of our experiments with different recent formulæ it struck us to try one of these plates with a "strong" developer, and we employed for the purpose a formula given to us privately by a friend for use with plates of his own preparation. The quantities of the various ingredients were, for two ounces of solution, as follow:—

Pyro.	3 grains.
Bromide of ammonium	3 ,,
Strong ammonia	10 minims.
Water	2 ounces.

Now, it will be observed that the pyro. here is only half the strength usually recommended, while the bromide and ammonia (especially the former) are far above the ordinary quantity. The result of the application of this solution considerably surprised us. The action was rapid, and, in place of the ghostly images we had previously obtained from the same plates, a strong, vigorous negative resulted. We have tried the same developer since with several different descriptions of plates, and in nearly every case the increased quantity of ammonia with a corresponding increase of bromide has had a greater effect in producing density than any practicable augmentation of the strength of pyro. could possibly have. This, it must also be borne in mind, occurs without any "slowing" action upon the plate; in other words, the increase in the quantity of bromide has no effect on the sensitiveness of the plate, while extra strength of the ammonia, if duly restrained with bromide, has not the slightest tendency to produce fog.

Captain Abney says, in commenting on the foregoing:—Regarding the proportion of ammonia to bromide, of which so much has been aptly written, one point, I think, has been left out of the question, which is that by increasing the amount of gelatine in an emulsion the bromide may be diminished. Thus, some plates which have the proportion of gelatine to nitrate of silver converted as about two to one, may be developed without any bromide whatever; whilst, if they contain the proportion, which I use myself, of four to five it is absolutely fatal to curtail a good dose of the retarder, and I think it will be found that in most commercial plates for which special formulæ for development are given the proportions of gelatine to nitrate of silver may be approximately guessed by noting the proportion of bromide to ammonia. I should also like to call attention to the action that takes place by soaking the plate in different solutions before proceeding to develope. When a plate is soaked in the pyrogallic acid just when the ammonia and bromide are applied, we are, in fact, using a proportionally weaker solution; since, till sufficient time has elapsed to enable the developer in the cup to mix with the pyro. in the film, the developer will not be of normal strength as if all three were mixed together and then applied. To make this clearer: it may be supposed that the whole of the pyrogallic acid solution has been absorbed by the film, and that then the ammonia and bromide solutions are applied. Evidently for the first few seconds, at all events, the proportion of pyrogallic to the other two solutions in the top layer of the film will be increased, and hence the development will be retarded. By flooding the plate first with pyrogallic acid and bromide the plate should be still further "slowed," since in this case not only would there be the slowing caused by what has been pointed out, but there wonld be an increased proportion of bromide in the top layer of the film which, if the normal developer be rightly balanced, should increase the slowing effect.

Mr. R. N. Hormazdji, M.A.C.S., gives a somewhat modified formula in which the pyro. is reduced to a very low proportion. He says:—Of late the tendency has been to increase the amounts of bromide and of ammonia, and to decrease the amount of pyro. in the developer; but I have not seen the pyro. so reduced and the ammonia and bromide so increased as in the developer I employ. By its use I get full density always, with latitude of exposure. I have not intensified any negatives since I used it. The formula is:—

Pyro	½ grain.
Bromide of potassium	5½ grains.
Ammonia	10 minims.
Water	1 ounce.

Always soak the plate in water in the developing dish, and let it stay there whilst the daveloper is prepared. Pour off the water, and flood the plate with the pyro. and bromide; let it remain about twenty seconds. Now pour off into the glass measure containing the ammonia, and then pour on again, keeping the dish rocking. The details come out soon and are of full density, so that by the time the details are well out the density will be sufficient. A great advantage is that the plate stands less risk of staining from decolourised pyro

WARNERKE'S NEW EMULSION PROCESS.

The following is a brief outline of a new emulsion process patented by Mr. Leon Warnerke, and which is based upon an entirely new principle not hitherto recognised in connection with a developed gelatino-bromide image. In a paper read before the Photographic Society of Great Britain Mr. Warnerke says:—Some short time ago, when investigating the nature of the photographic image developed on gelatine plates, I observed that the portion of the gelatine emulsion submitted to the combined action of light and the developer became insoluble in warm water.

For general negative making he proceeds in the following manner:—A sheet of paper is covered by the ordinary gelatine emulsion and dried. A precaution to be observed is that the coating of the emulsion must be uniformly homogeneous, and when the sheet is dry that it remains flat. This paper is to be used, instead of a glass plate, in the camera—in fact, in all cases where sensitive plates are used for obtaining negatives or positives. The exposure is in accordance with the sensitiveness of the emulsion, but it remains strictly the same whether the emulsion is spread on glass or on the paper. The exposed sheet of gelatinised paper is next developed with alkaline *pyrogallol* development, exactly in the same manner as with the glass plate. After development it may be fixed or it may not; then it is preferably dried. Insolubility of the developed portion is produced as soon as the image is fully developed, but it is not so complete whilst the film is still wet. The same is the case with the action of alum on gelatine; and for this reason it is advisable to dry the image before the next stage of the process, which consists in removing by solution in hot water all parts of the emulsion film not acted upon by light and the developer, and which consequently remains insoluble in warm water. The action of light and the developer penetrates into the thickness of the film more or less in various parts of the image according to the intensity of the light. It follows from this that under the insoluble portion of the image there may still remain some gelatine not reached by the light and the developer, and consequently soluble. It would be, therefore, useless to put the sheet bearing the image in warm water just as it was developed, because the image, also insoluble, would be "under-washed" and beyond possibility of recovery. This explanation is only necessary for the very few not acquainted with the principles and practice of the carbon process. In reality, from this point I follow exactly all the rules of the carbon process; that is, the gelatine surface of the paper bearing the image must be cemented to some impervious material, and washed from the back or paper side until all soluble gelatine is removed. Now, what impervious material is to be chosen? This choice depends upon the destination of the developing image. In the case of negatives glass is very convenient; and it may be used without any preparation, or it may be collodionised, or varnished with gum dammar or other varnish or waxed. Cementing the image is produced by putting the gelatine surface in contact with the support under water, and removing with a squeegee all superfluous water. When unprepared glass is used it is advisable to leave the image there until it is dry; in all other cases only for a few minutes. Next, the glass, with the paper cemented to it, is plunged into warm water, and very soon the paper which is thus loosened can be stripped off and all the soluble gelatine washed away, leaving only the insoluble portion forming the image. This is washed in cold water, and the negative is finished. It will be observed that this negative, when used for ordinary silver printing, will give reversed images. This can be obviated by several means: by cementing the developed image to transfer paper, which is made by rendering the paper waterproof and greased on the surface (an excellent paper of this description is supplied by the Autotype Company, under the name of "flexible support"), and, when the image is finished, to transfer it to glass, on which it will remain permanently; or by using a paper bearing a film formed of collodion or insoluble gelatine, or a combination of the two. In this case the image will be produced on the film, the paper being stripped

off by rubbing turpentine on it, as was indicated by myself for my sensitive negative tissue. The printing in this case can be done from either side. Lastly, the image can be developed on the collodionised glass, the glass being first rubbed with talc; it can then be backed with my previously-described film-tissue or with a sheet of gelatine, or the film can be made by coatings of collodion or gelatine, and, when dry, stripped. By either of these methods the negative can be reversed without any difficulty; but, for myself, I prefer to have it on the film, and this can be produced of sufficient thickness to form not only the substitute but also the nearest approach in appearance to glass.

The advantages claimed for this process are, amongst others, the total elimination of blurring or halation, and a considerable lessening of the risk of failure from over-exposure. Mr. Warnerke also hopes to apply the process to the production of Woodburytype reliefs and similar purposes, also for obtaining images to be burnt-in upon ceramic ware. For full particulars our readers are referred to Mr. Warnerke's elaborate paper in THE BRITISH JOURNAL OF PHOTOGRAPHY for May 27, 1881.

DR KENYON'S PROCESS OF EMULSIFICATION IN DAYLIGHT.

DR. G. A. KENYON communicated to the members of the Liverpool Amateur Photographic Association the following working details of a process for emulsifying in daylight:—In the plates I exhibit there will be discerned no vestige of light fog or chemical fog, or any other evil; yet the cooking of the emulsion with which these plates were prepared was effected (with a small proportion of the gelatine) by boiling over the full flame of a Bunsen burner. The vessel containing the emulsion was only separated from the flame by a piece of tin and a-quarter of an inch of sand—that is, a sand bath was used instead of a water bath, and the heating was continued for two hours. The thin emulsion was thus most effectually boiled. Moreover—and to this also I wish to draw your special attention—the whole mixing and preparation of the emulsion prior to the washing was conducted in the ordinary light of day. The only difference from what is usual in the process employed was the placing of double the amount of water in the emulsion to allow for loss by evaporation, and the addition of ten grains of bichromate of potash to each ounce of the water employed first in the subsequent washing by Wratten and Wainwright's method, the minute threads of emulsion being allowed to soak for one hour in the bichromate solution. To Captain Abney we are indebted for the knowledge that by this means both light fog and chemical fog are eliminated. Captain Abney has recommended the use of bichromate where fog is *accidentally* incurred. By the time this is discovered the remedy will be too late commonly to be of mnch use, considering that its then application involves *fresh* manipulations, washings, and drying. My claim is to have discovered that the efficacy of bichromate is such that daylight and comparatively unlimited heat may be deliberately and advantageously employed in the preparation of the emulsion; and I make bold to recommend its introduction as a part of the regular everyday procedure, whereby we may have the comfort of working in ordinary light and in a room warmed and ventilated with an open fire, at the same time that we can easily see what is going on, and amongst other things use test paper *ad libitum.* The formula adopted by Dr. Kenyon was that given at page 395 of the volume of THE BRITISH JOURNAL OF PHOTOGRAPHY for 1879, and the resulting plates are said to be extremely rapid as well as free from fog or veil.

MR. H. Y. E. COTESWORTH'S METHOD OF EMULSIFICATION WITH BICHROMATE OF POTASH.

SUBSEQUENT to the publication of Dr. Kenyon's process given above, Mr. H. Y. E. Cotesworth proposed the employment of the chromic salt in the

emulsion itself instead of in the washing water. The proposition was merely put forward in the shape of a suggestion, with a view of securing the advantages of the desensitising action of the bichromate during the whole period of emulsification and not merely afterwards. Here is what Mr. Cotesworth himself says :—My proposition is to use the bichromate in the emulsion itself during its preparation, and thus gain a double degree of security in the prevention as well as the removal of fog. It seems to me that an emulsion in the liquid state, containing bichromate of potash (or any alkaline bichromate), would be practically insensitive to light, for any effect produced by the light's action would be almost instantly neutralised. Further than this : any of the evils arising from over-boiling or from impurities in the materials would most probably be counteracted. Thus, the ammonia which is stated to be liberated by the action of heat in "cooking" would be taken into combination with the bichromate, which would be gradually converted into a neutral chromate, and thus play the useful part of the free acid recently recommended. Any oxide or sub-haloid of silver, either present as impurity or formed during the cooking process, would in like manner be converted—first, into chromate of silver, and then into bromide by the excess of soluble bromide present; and the final result would be an emulsion of pure silver haloids *plus* chromate or bichromate of potash, or, according to the salts used in sensitising, possibly a double chromate of potash and ammonia. This method would seem to be most applicable to the boiling method of emulsification, in which a very small proportion of the gelatine would be submitted to the action of the bichromate for a short time. In the case of more prolonged emulsification possibly the action of the bichromate on the whole quantity of the gelatine might exercise a deleterious influence, though I scarcely think such would be the case to any appreciable extent. In order to derive the full benefit from the arrangement it would, perhaps, be convenient to add the bichromate to the bromised gelatine before sensitising, reserving a small proportion of the soluble bromide so as to have an actual formation of silver chromate in the emulsion as well as an excess of bichromate. This would give a red emulsion during the period of cooking, and the subsequent addition of the remainder of the bromide would decompose the silver chromate and leave a further quantity of alkaline chromate to exercise its de-actinising action. In putting the matter to a practical test the questions to be decided are—first, will the action of the bichromate upon the gelatine for a short time at a high temperature, or at a lower temperature for a prolonged period, be injurious? and, second, will such a method enable us to prepare an emulsion of a high degree of sensitiveness? If experiment answer these queries favourably, then I think a very great deal of the trouble of emulsion preparation will disappear.

A CHROMATE OF SILVER EMULSION.

THE following process was communicated by M. Paul Roy, of Algiers, in a letter to *Le Moniteur* :—My process is based on a reaction which I have nowhere seen stated, namely, that gelatine containing chromate of silver in emulsion coagulates in presence of an excess of alkaline bichromate. I put into a bottle a hundred grammes of water and one gramme of gelatine, and when this is dissolved I add ten grammes of nitrate of silver. Into this solution, raised to 50° C., I gradually pour a saturated solution of bichromate of ammonia, shaking it frequently. At first a precipitate of red chromate of silver is formed, which remains emulsified; then, as soon as the bichromate of ammonia is in excess, the gelatine precipitates, taking with it the chromate of silver. When the proportion of gelatine is greater the whole collects in a clot. This precipitate of chromate of silver, having been washed several times in the same bottle, is qualified to produce an emulsion of bromide, iodide or chloride of silver. To this effect the

necessary quantity of alkaline bromide, iodide, or chloride is put into the bottle and shaken. The reaction takes place very rapidly. As soon as every trace of red chromate has disappeared the liquid is poured off and washed several times until it becomes colourless. The result is a precipitate of bromide, iodide, or chloride of silver, which only requires the heat of the water bath to form an emulsion of the greatest delicacy, and which will pass entirely through the paper filter. * * * * * * The advantage which this process presents is that the chromate of silver gelatine, when precipitated, swells under the action of alkaline bromides, iodides, and chlorides, so as to form a sort of sponge, which washes with the greatest facility. The emulsion once obtained there is no reason why it should not be submitted to the temperature of boiling water, and the usual practical operations be followed.

PRECIPITATION OF GELATINE EMULSION BY ALCOHOL.

The following method of precipitating a gelatine emulsion by means of alcohol, in lieu of the usual washing to remove the soluble salts, is given by Mr. W. K. Burton. It differs from the ordinary mode of precipitation in that the silver bromide is formed in a very weak solution of gelatine, which enables the precipitation to be effected with a smaller quantity of alcohol, while the precipitate is obtained in a more convenient form. Mr. Burton says :—The practical manner of making an emulsion by this method may be as follows. Make up the following mixtures :—

I.

Silver nitrate	400 grains.
Water	3 ounces.

II.

Gelatine	24 ounces.
Ammonia bromide	240 grains.
Water	3 ounces.

Hydrochloric acid enough to slightly acidify the solution.

III.

Gelatine	20 grains.
Water	½ ounce.

IV.

Hard gelatine (say Nelson's X opaque, or Mr. A. L. Henderson's)	240 grains.
Soft gelatine (Nelson's No. 1)	240 ,,
Water	24 ounces.

Nos. II., III., and IV. are allowed to stand until the gelatine is softened. No. I. is then warmed in a hock bottle until the gelatine is just melted, when No. II. is poured into it, a little at a time, with vigorous shaking until the whole is emulsified. It is then transferred to an ordinary jelly-can, which is placed in a saucepan half full of water over a ring Bunsen burner in the dark room, and boiled for half an hour. It is then allowed to cool to about 100° Fahr., when No. III. is added. The whole is then allowed to get quite cool, when it is poured, with stirring, into about one pint of methylated spirit. If it be wished the precipitate may now be filtered out and washed at once like an ordinary filtrate, but I prefer to allow it to settle, which it will do in about five minutes. The supernatant fluid is then gently poured off. This fluid will have the appearance of still containing a considerable amount of the silver bromide; but if it be kept and filtered it will be seen that the quantity is really so small that it may be disregarded. We all know what an alarming quantity of silver seems to be going down the sink when we wash vessels to which a very small quantity of emulsion is adhering. If filtering be resorted to the liquid which comes through will be quite clear. This was somewhat unexpected by me, as, an emulsion containing the whole of the gelatine be precipitated into alco

hol in the usual way, the alcohol becomes milky with a substance which could not, I imagine, be filtered from it. Two or three ounces of methylated spirit are now added to the vessel containing the silver bromide, and the latter well mixed with it. This makes the precipitate "firmer"—if such an expression be allowable—and this time it will sink to the bottom almost immediately after the stirring has ceased, and the alcohol may be poured off. I consider that the bromide in this state is practically free from soluble salts, but it may be washed with one or two changes of water if desired. No. IV. is now gently heated till the gelatine is melted and the precipitate mixed with it. It must be kept warm for some time, and shaken vigorously until all granularity has disappeared. This is, of course, ascertained by placing a drop of the emulsion on a piece of glass, and examining it. If it be wished to keep the bromide of silver for future use it may be placed on a piece of muslin stretched in the drying-box, when it will dry in a very short time; and, although I cannot speak from experience on this point, it will, I have no doubt, keep for an indefinite time so long as light is kept from it.

Mr. H Y. E. Cotesworth subsequently published a modified plan, differing from Mr. Burton's in two essential points:—First, the emulsion was formed in a less concentrated state, by which he claims to obtain a finer state of division of the silver bromide; second, the alcohol—preferably warmed—is stirred into the emulsion while the latter is still hot enough to keep the bromide and gelatine from precipitating. As the mixture cools the gelatino-bromide gradually separates from the diluted alcohol in a flocculent state, when it is easily collected and washed. Mr. Cotesworth concludes his remarks with the following:—After this I made many experiments, varying the quantities of gelatine and water respectively to the same quantities of silver and bromide. I found that in reducing the quantity of water the tendency was always present to produce coarseness. I do not mean coarseness of the *whole* deposit, but a certain and more than merely appreciable quantity of silver bromide was filtered out. On the other hand, I feared that by increasing the quantity of gelatine I should lower the sensitiveness of the resulting emulsion unless the cooking were carried much further. After several trials, however, I came to the conclusion that if such slowing action be really present it is so slight as to be practically undetectable, and I have now no hesitation in giving the following formula:—

1.

Ammonium bromide	60 grains.
Gelatine	50 ,,
Water	1 ounce.

2.

Silver nitrate	100 grains.
Nitric acid	2 minims.
Water	4 ounces.

Mix in the ordinary way, and boil for fifteen to thirty minutes according to the degree of sensitiveness required. The silver bromide will be in such a fine state of division that a much longer boiling may be given, if necessary, and the decomposed gelatine resulting from such boiling will be removed in the subsequent precipitation. When the "cooking" is finished allow the emulsion to cool down to (say) 150°, and then stir in five ounces of good methylated alcohol, continuing the stirring for a minute or two after the whole of the spirit has been added. Plunge the vessel into cold water, and in a short time the silver bromide will be found at the bottom. If left too long a partial "jellification" of the almost clear, supernatant liquid may occur; hence it is advisable to pour the latter off, and wash the precipitate—first with a small quantity of alcohol, and subsequently with two or three changes of distilled water as soon as possible. To make

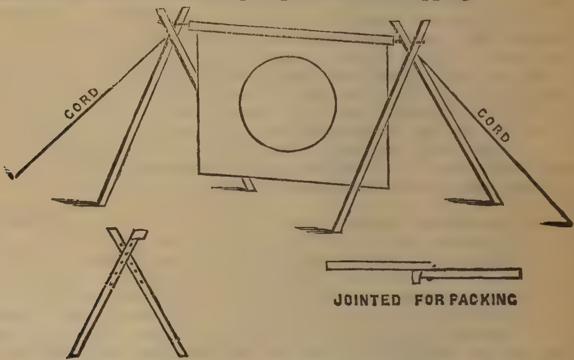
the final emulsion, dissolve seventy-five grains of good gelatine in three ounces of water, and thoroughly incorporate it with the precipitated bromide; when perfectly mixed make up the bulk to five ounces. At first sight this process does not appear to differ much from Mr. Burton's, nor does it in principle; but anyone trying the two side by side will notice a very wide difference in the character of the films given in either case, as I have done myself since I wrote last week. In following my plan I claim that there is not the slightest loss of silver by precipitation in the coarse form, and that without the observance of any particular care in the emulsification. As regards simplicity of manipulation there is little to choose between them.

THE MECHANICAL CONTRIVANCES OF THE YEAR.

PORTABLE LANTERN SCREENS.

Messrs. Baynham Jones and R. Keene, Jun., have described their respective screens for use when working with the lantern away from home. Mr. Baynham Jones says, in explanation of his diagram:—

It consists simply of four strips of deal (say) ten feet long and about $1\frac{1}{2} \times 1$ inch in size. Each strip has at its upper end five or six holes, through any two of which, according to the height required, passes a screw bolt with a nut. When opened these strips form unequal crosses, in the upper angles of which rest two iron pins fixed in the ends of the roller. There are short spikes at the bottom of each strip to prevent their slipping.

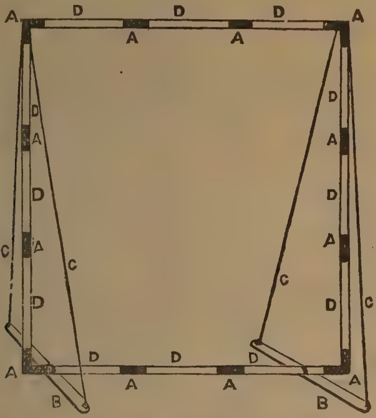


A small cord is provided having two loops at the distance apart of the two uprights, which are hooked over their upper ends, and the ends of the cord are then fastened to the floor by means of a tack at four or five feet distance. These cords make the stand perfectly steady.

Mr. Keene's apparatus is also figured and his own description appended:—

I use an ordinary twelve-feet linen screen with brass eyelet holes round the edges; my frame consists of twelve round, short poles, with copper sockets at one end, so as to fit together like a fishing rod. Four of these sockets are angle pieces for the corners. The poles are really common sweeping-brush handles, which may be purchased at any ironmonger's for a few pence. In addition to the poles I have two flat pieces of wood about three feet in length with a hole drilled through the centre, and in putting

the frames together these are fitted at the two bottom corners and serve as feet. Two cords from the top of the screen—one at the back and one at the front—tied to the end of each foot keep the whole thing upright wherever placed, and it is quite independent of any fastening either to the walls of a room, the floor, or anywhere.

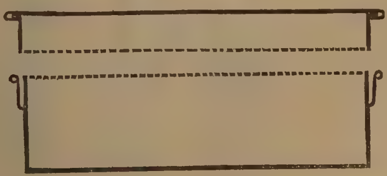


A Useful Lantern Screen and Stretcher

A Copper sockets. B Flat wooden feet C Thin cord. D Brush handles. The screen is tied on the stretcher by tapes. The whole thing packs into a compact bundle, like a large fishing rod.

PLATE-BOXES FOR STORING GELATINE PLATES.

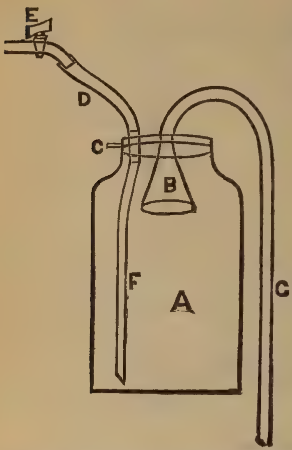
Mr. William Bedford writes :—I send you a sketch of a light and damp-proof box for storing dry plates and negatives. I am having some made of the same pattern for carrying gelatine plates while travelling, and as I think they will prove efficient for the purpose, and, moreover, inexpensive, perhaps some of your readers may like to adopt the design. I propose to pack the plates in the boxes face downwards, with a sheet of pure paper between each, strips of paper having first been placed across the length and breadth of the box to form a lining and prevent any lateral shake when filled



Mine are for $9\frac{1}{2} \times 7\frac{1}{2}$ plates and two inches deep, and are neatly made of light tin plate, by Messrs. Ponders and Baker, of Featherstone-street, Finsbury, at a cost of sixteen shillings a dozen, japanned outside.

APPARATUS FOR WASHING GELATINE EMULSION.

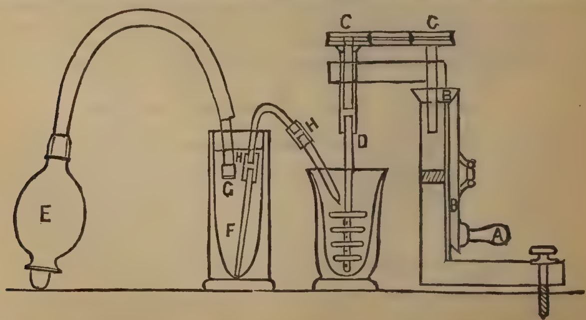
In a paper read before the Edinburgh Photographic Society, Mr. J. M. Turnbull described the following piece of apparatus for washing gelatine emulsion. He says:—The emulsion is squeezed through canvas into a jar of water, the water and gelatine poured into the washing jar, and the bung put in tightly; the whole is then carried from the dark room to the water supply, the end of the rubber tube is slipped on to the water tap, and the water turned on with sufficient force to pass through the contents of the jar. The emulsion is thus kept in constant motion and thoroughly washed. The waste water passes through the muslin over the mouth of the funnel, and is discharged through the tubing into the sink. The annexed diagram will assist the reader to understand the foregoing explanations. After the water has run for about half-an-hour the emulsion will be found sufficiently washed. When this is completed the jar is again removed to the dark room, the contents emptied into a sieve, covered with a thin cotton cloth, and properly drained. The cloth, of course, retains the drained emulsion, which can now be melted to coat the plates.



A Jar. B Inverted funnel. C Bung carrying funnel and short piece of glass tube. D Rubber tube to water supply. E Water tap. F Rubber tube to bottom of jar. G Rubber tube for waste water.

AN APPARATUS FOR MIXING EMULSION.

Mr. A. Coventry laid before the members of the Manchester Photographic Society an apparatus for mixing gelatine emulsion, which he accompanied with the following remarks:—In the formation of an emulsion the object we strive for is to precipitate the bromide of silver in as fine a state of sub-



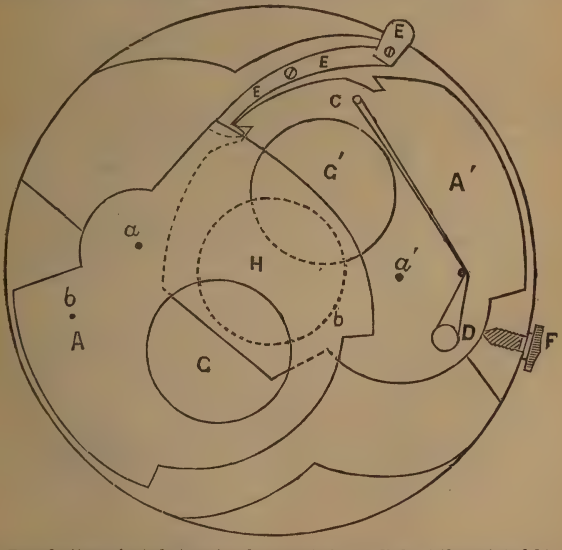
division as possible. This is not a matter of difficulty where a large proportion of gelatine is present; but the more we reduce the quantity of

gelatine the more delicate does the operation become. A high temperature also increases the difficulty; it is, therefore, best to mix at a temperature not exceeding 100°, and to introduce the silver solution very gradually while the bromised gelatine is kept in a state of agitation. Various mechanical methods have been devised for accomplishing this purpose, one of which is shown.

The handle A being turned transmits motion through the bevel wheels, B B, and pulleys, C C, to the splindle D (this is of vulcanite, with glass stirrers), and agitates the gelatine. The enema ball, E, being squeezed, forces air into the vessel, F. The pressure being retained by a valve at G, the air pressure drives the silver in a fine stream into the gelatine. H H are pure rubber connections.

AN INSTANTANEOUS SHUTTER.

Mr. C. Arthur Barclay has invented a new instantaneous shutter which differs in some respects from others hitherto described. It opens and closes at the centre of the lens, and Mr. Barclay says of it:—I first tried a single disc of card one and a-half inch aperture revolving in front of the lens; but, the exposure being more protracted near the centre than the circumference of the disc, I was led to pivot another disc exactly opposite to and superimposed on the first, and united them together with a link similar to that in the coupled driving-wheels of locomotives.



A A, Two shutters pivoted at $a\ a'$ and connected by a link at the points $b\ b'$. C D Elastic band. E Spring catch to set and release shutter. F Micrometer screw to regulate exposure. G G' Exposing apertures. H Aperture of lens.

The motion is given by means of an india-rubber band, and is applied only to the lower disc, a reciprocating movement being imparted to the

upper one by the link described above. This method gives a perfect exposure to every part of the plate, commencing from and finishing at the centre, and, of course, doubling the speed. The duration of exposure can be regulated to a nicety by the micrometer screw, which acts as a break, and thus exposures can be obtained from a second up to a hundredth part thereof, or any speed desired, by increasing the strength of the india-rubber band.

A FILTER FOR GELATINE EMULSION.

A SIMPLE piece of apparatus is described in a leading article in THE BRITISH JOURNAL OF PHOTOGRAPHY intended for the purpose of filtering gelatine emulsion under pressure, or rather by exhaustion, and adapted for use in

FIG. 2.

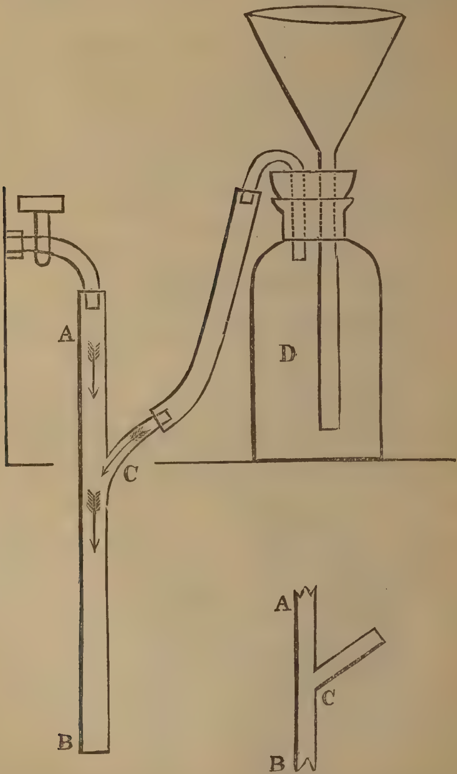


FIG. 1.

connection with the ordinary water tap to supply the exhaust. The article in question says:—Where the pressure can be obtained from the main

direct a very cheap and simple arrangement can be constructed for a few pence. Procure a short length of lead pipe about a quarter or three-eighths of an inch in diameter, and cut off (say) a foot; somewhere about the centre of this perforate the pipe and solder on a side joint, as in *fig.* 1. The longer the portion from C to B the better it will work. If this be connected by means of an india-rubber tube with the water tap, the water from the latter in rushing down (under pressure) the tube A B will suck the air through the side tube C, and so exhaust any vessel that may be connected with C.

Fig. 2 shows roughly an arrangement for filtering by exhaustion adaptable to any ordinary tap where the pressure comes direct from the main. If the tap be situated in a basement or lower story, and the immediate water supply be a cistern some feet above it, a similar though not so powerful exhausting action will be produced, provided the pipe running from the cistern to the tap be moderately straight and free from sharp turns. The jointed leaden "aspirator," A B C, may be left attached to the water tap as a fixture, and connected with the filter arrangement, D, by means of a stout rubber tube when the latter is required for use. Or the aspirator may remain fixed to the filter, and form part of it, to be attached to the water tap when required. It is desirable to have a moderate length of pipe between the points C and B; if it cannot be arranged to have a direct fall of two or three feet a length of india-rubber tubing may be attached to supply the deficiency.

FORMULÆ.

Formulæ for the "Dusting-on" Process of Photo-Enamelling, Printing Opalotypes, Reproducing Negatives, Producing Pictorial Effects in Negatives, &c., &c.

No. 1.

Saturated solution of bichromate of ammonia ..	5 drachms.
Honey	3 ,,
Albumen	3 ,,
Distilled water	20 to 30 ,,

No. 2.

Dextrine	½ ounce.
Grape sugar	½ ,,
Bichromate	½ ,,
Water	½ pint.

No. 3.

Gum arabic................................	6 parts.
Bichromate of potash	2·5 ,,
Grape sugar	4
Water	72 ,,

No. 4.

Honey	4 drachms.
Glucose	8 ,,
Albumen	6 ,,
Dextrine	3 ,,

Alkaline Developer.

No. 1.

Carbonate of ammonia	40 grains.
Water	1 pint.

No. 2.

Pyrogallic acid	96 grains.
Alcohol	1 ounce.

No. 3.

Bromide of potassium	5 grains.
Water	1 ounce.

Have these mixed in separate bottles. Having wet the surface of the plate with a mixture of alcohol and water, about equal parts, wash, and apply sufficient of No. 1 to cover the plate, having previously added to it a few drops of No. 2 and the same of No. 3. This will speedily bring out the image. Some occasionally use the pyrogallic acid so strong as from five to eight grains to the ounce, but the above proportions will be found generally useful.

The following preparation is advisable for use with a collodion pellicle emulsion:—

No. 1.

Strong ammonia	1 drachm.
Water	13 drachms.

No. 2.

Bromide of cadmium	5 grains.
Water	1 ounce.

No. 3.

Equal proportions of Nos. 1 and 2.

A three- or four-grain solution of pyrogallic acid, or one stronger if preferred, is applied and allowed to remain on for about a minute, by which time the image will have appeared. The solution is then poured off into a measure, and to each drachm is added six drops of the mixture from the No. 3 bottle. If the subject be a flat, tame one, requiring greater vigour, the proportion of bromide may be increased, but no ammonia must be added except that which has been previously mixed with bromide. This preparation may be advantageously used for other processes, both in the manner just described and also by mixing the bromide and ammonia with the pyrogallic acid solution before the latter is applied.

Collodion.—Ordinary Bromo-Iodised.

A.—	Sulphuric ether	20 ounces.
	Alcohol	10 ,,
	Pyroxyline	2½ drachms.
B.—	Iodide of cadmium	90 grains.
	Iodide of ammonium	90 ,,
	Bromide of ammonium	40 ,,
	Alcohol	10 ounces.

One part of B (the iodising solution) must be added to three parts of A, which ought to be labelled "plain collodion."

Selected Toning Formulæ.

No. 1.

Chloride of gold	1 grain.
Acetate of soda	30 grains.
Water	8 ounces.

This must not be used till one day after preparation. It keeps well, and gives warm, rich tones.

No. 2.

Chloride of gold	1 grain.
Bicarbonate of soda	4 grains.
Water	8 ounces.

This is ready for immediate use after preparation, but it will not keep.

No. 3.

Chloride of gold	1 grain.
Phosphate of soda	20 grains.
Water	8 ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

No. 4.

Gold solution	10 drachms.
Acetate of lime	20 grains.
Chloride of lime	1 grain.
Tepid water	20 ounces.

The "gold solution" before mentioned is prepared by neutralising as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces of tepid water, which will prove sufficient to tone a full-sized sheet of paper.

No. 5.

Chloride of gold	15 grains.
Water	5 ounces.

Neutralise with lime water, make up to fifteen ounces with water, and add two drachms of chloride of calcium. This stock solution will keep for a long time for use. Dilute one ounce with ten ounces of water.

No. 6.

TONING AND FIXING IN ONE BATH.

Chloride of gold	1 grain.
Phosphate of soda	15 grains.
Sulphocyanide of ammonium	25 ,,
Hyposulphite of soda	240 ,,
Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

DEVELOPERS.

FOR COLLODION POSITIVES OR FERROTYPES.

Protosulphate of iron	1½ ounce.
Nitrate of baryta	1 ,,
Water	1 pint.
Alcohol	1 ounce.
Nitric acid	40 drops.

FOR NEGATIVES.

No. 1.

Protosulphate of iron	¼ ounce.
Glacial acetic acid	¼ ,,
Alcohol	½ ,,
Water	8 ounces.

No. 2.

Protosulphate of iron	15 grains.
Acetate of soda	15 ,,
Glacial acetic acid	30 minims.
Alcohol	30 ,,
Water	1 ounce.

No. 3.

Protosulphate of iron	1 ounce.
Glacial acetic acid	1 ,,
Citric acid	½ drachm.
Water	1 pint.

No. 4.

Ammonio-sulphate of iron	75 grains.
Glacial acetic acid	75 ,,
Sulphate of copper	7 ,,
Water	3 ounces.

No. 5.

Protosulphate of iron	7 drachms.
Water	20 ounces.
Collocine	2 small drops.
Alcohol	*quant. suff.*

This developer can also be used for glass positives and ferrotypes.

No. 6.

Protosulphate of iron	1 ounce.
Water	20 ounces.
Liquor ammonia	10 minims.

Then add—

Glacial acetic acid	1 ounce.
Alcohol	*quant suff.*

This solution when newly made has all the advantages of one that has been kept to age.

NOTE.—One or the other of these negative developers is in daily use by the most eminent members of the profession.

FOR COLLODION TRANSFERS.

Pyrogallic acid	5 grains.
Citric acid	3 ,,
Acetic acid	45 minims.
Water	1 ounce.
Alcohol	*quant suff.*

PYROGALLIC ACID DEVELOPER OR INTENSIFIER.

Pyrogallic acid	3 grains.
Citric acid	2 ,,
Water	1 ounce.

For intensifying it is advisable to increase the proportion of water.

INTENSIFYING SOLUTION.

A.—Pyrogallic acid	3 grains.
Water	1 ounce.
B.—Nitrate of silver	10 grains.
Citric acid	20 ,,
Acetic acid	1 drachm
Water	1 ounce.

For use mix a few drops of B with enough of A to cover the surface of the plate.

Formula for Negative Varnish.

Sandarac	4 ounces.
Alcohol	28 ,,
Oil of lavender	3 ,,
Chloroform	5 drachms.

Another.

Tough, hard, and durable:—

Shellac	$1\frac{1}{4}$ ounce.
Mastic	$\frac{1}{4}$,,
Oil of turpentine	$\frac{1}{4}$,,
Sandarac	$1\frac{1}{4}$,,
Venice turpentine	$\frac{1}{4}$,,
Camphor	10 grains.
Alcohol	20 fluid ounces.

Another.

White hard varnish	15 ounces.
Methylated alcohol	25 ,,

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

Another.

Sandarac	90 ounces.
Turpentine	36 ,,
Oil of lavender	10 ,,
Alcohol	500 ,,

Another.

This one may be rubbed down with powdered resin, and gives a splendid surface for retouching:—

Sandarac	2 ounces.
Seed lac	1 to $1\frac{1}{2}$ ounce.
Castor oil	3 drachms.
Oil of lavender	$1\frac{1}{2}$ drachm.
Alcohol	18 fluid ounces.

Negative Retouching Varnish.

Sandarac	1 ounce.
Castor oil	80 grains.
Alcohol	6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

Ground Glass Varnish.

Sandarac	90 grains.
Mastic	20 ,,
Ether	2 ounces.
Benzole	$\frac{1}{2}$ to $1\frac{1}{2}$ ounce.

The proportion of the benzole added determines the nature of the matt obtained.

Encaustic Paste.

Pure wax	500 parts.
Gum elemi	10 ,,
Benzole	200 ,,
Essence of lavender	300 ,,
Oil of spike	15 ,,

Chromograph Mixture.

Make a zinc tray about a quarter of an inch in depth, and pour into it a warm solution made as follows :—

Water	4 ounces.
Sulphate of baryta	2½ ,,
Sugar	1 ounce.
Gelatine	1 ,,
Glycerine	6 ounces.

Write whatever is required to be printed upon a sheet of white paper, using instead of ordinary ink the aniline colour known as "violet of methylaniline;" as soon as the writing is pretty dry lay it upon the gelatine surface and rub the back of the paper with the palm of the hand. The ink will be absorbed by the gelatinous product. All that is to be done in order to obtain a *facsimile* of the writing is to lay a sheet of paper upon the writing on the gelatine and rub the back with the hand. From forty to fifty can thus be drawn off in a few minutes.

Waxing Solution for Glass Plates for Removing Collodion Films.

No. 1.

Bees wax	20 grains.
Benzole rect. No. 1	4 ounces.

For Flexible Supports (Autotype).

No. 2.

Yellow rosin	3 drachms.
,, bees wax	1 drachm.
Rectified spirits of turpentine	10 ounces.

Sensitising Solution for Carbon Tissue.

Bichromate of potash	1 ounce.
Water	20 ounces.
Liquor ammonia	6 minims.

Solutions For Silvering Glass Mirrors (Martin's).

A.

Nitrate of silver	175 grains.
Distilled water	10 ounces.

B.

Nitrate of ammonia	262 grains.
Distilled water	10 ounces.

C.

Pure caustic potash	1 ounce (avoirdupois).
Distilled water	10 ounces.

D.

Pure sugar candy	½ ounce (avoirdupois).
Distilled water	5 ounces.

Dissolve and add—

Tartaric acid	50 grains.

Boil in a flask for ten minutes, and when cool add—

Alcohol	1 ounce.

Distilled water *quant. suff.* to make up to 10 ounces.

For use take equal parts of A and B. Mix together also equal parts of C and D, and mix in another measure. Then mix both these mixtures together in the silvering vessel, and suspend the mirror face downward in the solution.

BURTON'S PROCESS FOR SILVERING GLASS MIRRORS.

SOLUTION 1.

Nitrate of silver	25 grains.
Distilled water	1 ounce.

SOLUTION 2.

Potash (pure)	25 grains.
Distilled water	1 ounce.

SOLUTION A.

Solution 1, Solution 2	equal parts.
Ammonia	to just dissolve the precipitate.
Solution 1	to just cause a discolouration.

SOLUTION B.

Loaf sugar	2,700 grains.
Distilled water	20 ounces.
Nitric acid	2 drachms.
Alcohol (strong)	10 ounces.
Distilled water to make	80 ,,

For use—

Solution A	1 ounce.
Solution B	1 drachm.

Solution A is subject to slow decomposition; Solution B, on the contrary, improves by keeping.

SOLUTION FOR MOUNTING PRINTS WITHOUT THEIR COCKLING.

Nelson's No. 1 photographic gelatine	4 ounces.
Water	16 ,,
Glycerine	1 ounce.
Methylated alcohol	5 ounces.

Dissolve the gelatine in the water, then add the glycerine, and, lastly, the spirit.

FREEZING MIXTURES.

THE following mixtures will be found useful where ice is not readily obtainable:—

	Ingredients.	Parts by Weight.	Temperature Produced, Starting at 10° C.	Diminution of Temperature.
1	Water	1	16° C.	26° C.
	Nitrate of ammonia	1		
2	Water	16	12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	19°	29°
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	..	20°
	Chloride of sodium	2	..	..
5	Snow	1	..	45°
	Crystallised chloride of calcium	2	..	..
6	Crystallised sulphate of soda	8	20°	30°
	Hydrochloric acid	5		

DEVELOPING FORMULÆ FOR GELATINE PLATES.

MAWDSLEY'S.

The two following solutions may be mixed in bulk:—

No. 1.

Liq. amm. fort.	1 ounce.
Water	80 ounces.

No. 1A.

Liq. amm. fort	1 ounce.
Water	80 ounces.
Bromide potass	80 grains.

No. 2.

Pyro.	3 grains.
Water	1 ounce.

The developer for a properly-exposed picture is composed of equal parts of either of No. 1 and No. 2, or No. 1A and No. 2.

The addition of bromide of potassium to the developer tends to keep the shadows clear, but is not absolutely necessary in the hands of those experienced in dry-plate work.

WRATTEN & WAINWRIGHT'S.

ORDINARY.

A.	Pyro. acid	2 grains,	Freshly mixed.
	Water (ordinary)	1 ounce,	
B.	Bromide of potassium	15 grains.	
	Water	1 ounce.	
C.	Liquor ammonia	1 drachm.	
	Water	1 ounce.	

Development.—Lay the exposed plate in the dish in cold water (*hard*, not soft, water) for one minute, during which time pour into the developing cup one ounce of "A." Pour off the water and apply the "A," leaving it also on the film about one minute. Now drop into the cup (say) three minims or drops each of "B" and "C;" return "A" from the plate to the cup, and a perfect admixture will result. Reapply, and in about thirty seconds or so the image will begin to appear, and will gradually progress until the power of the developer is exhausted.

INSTANTANEOUS.—STOCK SOLUTION A.*

Ammonia liquor fort.	1 ounce.
Potass bromide	60 grains.
Water	3 ounces.

DEVELOPER.

Pyrogallic acid	3 grains.
Stock solution A*	20 drops.
Water	2 ounces.

Lay the exposed plate in a dish of cold water to soak while the pyrogallic acid is mixed. For each plate use at least three grains of pyro. diluted with two ounces of water. First pour off the water from the plate and apply the pyro. solution; then add five drops of "Stock Solution A*," and keep this weak developer on the plate until the highest lights are pretty well visible. Then add from fifteen to twenty drops more of "A*" to finish development.

SWAN'S.

Alkaline Pyrogallic Acid Development.—For alkaline pyrogallic acid development we recommend as a good basis, to be modified according to the judgment and experience of the operator, the following:—

No. 1 Solution.

Pyrogallic acid	15 grains.
Water	10 ounces.

No. 2 Solution.

Liquor ammonia (·880 s.g.)	1 ounce.
Bromide of ammonium	1 ,,
Water	½ ,,

These two solutions are to be used in the proportion of one or two drops of No. 2 to each drachm of No. 1. A graduated dropping tube with india-rubber cap is the most convenient means of measuring No. 2 solution. Those who dislike the use of the dropping tube, and prefer to employ solutions which can be mixed in equal proportions, may adopt the following formula:—

No. 1 Solution.

Pyrogallic acid	30 grains.
Water	10 ounces.

No. 2 Solution.

Liquor ammonia (·880 s.g.)	1 drachm.
Bromide of ammonium	1 ,,
Water	10 ounces.

If two ounces of developing mixture be required for developing a certain plate, then in using this second formula one ounce of each—No. 1 and 2 Solutions—is taken.

NELSON'S.

Make two stock solutions, and label them No. 1 and No. 2.

No. 1.

Pyrogallic acid	1 ounce.
Methylated spirit	7 ounces.
Distilled water	3 ,,
White sugar	1 ounce.

No. 2.

Strong liquid ammonia, ·880	4 ounces.
Water	2 ,,
Bromide of ammonium	1 ounce.
White sugar	½ ,,

Have your developing cup and a four-ounce graduated measure quite clean, also an ebonite or wooden dish varnished with shellac, slightly larger than the plate being used, and two two-drachm minim measures, one of which is kept for No. 1 and the other for No. 2. To develope (say) a half-plate, put half a drachm of No. 1 into the developing glass, then put half a drachm of No. 2 into the graduated measure, and add one and a-half ounce of water. Now lay the plate face upwards in the dish, pour the contents of the graduated measure into the developing cup, and flow the mixture steadily over the surface, avoiding air-bubbles; but, should any adhere to the film, at once remove them with the finger or clean camel's-hair brush. Gently rock the dish until the details are well out, which, if the exposure has been well timed, should be in about thirty seconds.

This answers equally for the ordinary and extra-rapid plates.

EDWARDS'S.

No. 1.

Pyrogallic acid	1 ounce.
Glycerine	1 ,,
Methylated alcohol	6 ounces.

Mix the glycerine and spirit and add the pyro.

No. 2.

Bromide of potassium (or ammonium)	60 grains.
Liquor ammonia, ·880	1 ounce.
Glycerine	1 ,,
Water	6 ounces.

The above stock solutions will keep any length of time.

To make the developer, add one part of No. 1 to fifteen parts of water, and label this bottle D (developer). In another bottle mix one ounce of No. 2 with fifteen ounces of water, and label it A (accelerator).

For use, mix equal parts of D and A. For under-exposure increase the proportion of A, and *vice versâ.*

HENDERSON'S FERROCYANIDE DEVELOPER.

Saturated solution of ferrocyanide of potassium	10 ounces.
Liquor ammonia, ·880	10 minims.
Pyrogallic acid	15 grains.

ANOTHER.

No. 1.

Saturated solution of ferrocyanide of potassium	1 ounce.
Pyrogallic acid	4 grains.

No. 2.

Liquor ammonia, ·880	10 minims.
Bromide of potassium	1 to 2 grains.
Water	1 ounce.

To make an ounce of developer take two drachms each of Nos. 1 and 2 and add half-an-ounce of water.

THOMAS'S.

The Development.—Prepare the following solutions:—

A. P.

Acid pyrogallic	40 grains.
Distilled water	20 ounces.

A. P. must be freshly prepared.

A. B.

Liquor ammoniæ, s.g. ·800	½ ounce.
Ammonium bromide	100 grains.
Distilled water	20 ounces.

A. B. will keep several months.

Just a moment before development mix equal parts of the above solutions in sufficient quantity; one ounce of each will be ample for a plate 8½ × 6½ in. Pass a broad camel's-hair brush over the plate to remove the slightest particle of dust, place it in a flat porcelain, glass, or ebonite tray, and flood it dexterously with the developer. The image quickly appears, and, if the correct exposure has been given, attains its full density in about a minute or a minute and a-half; then wash freely with water.

NOTE.—In case of under- or over-exposure, the development may be considerably modified by the judicious application of the A. P. and A. B. solutions. In case of over-exposure, add more of A. P.; for under-exposure more of A. B. *A. P. gives density; A. B. brings out half-tone.*

ROUCH'S.

Make the following solutions:—

A.

Pyrogallic acid	60 grains.
Nitric acid	3 to 5 minims.
Water	20 ounces.

B.

Liquor ammonia, ·880	1 ounce.
Bromide of potassium	2 drachms.
Water	2 ounces.

The solution B should be kept in an ordinary dropping-bottle. The object of nitric acid in the pyro. solution is to give it keeping properties; it may be omitted where only a small quantity of solution is made for immediate use.

INTENSIFYING SOLUTION FOR GELATINE NEGATIVES.

EDWARDS'S.

Saturated solution of bichloride of mercury	10 ounces.
Iodide of potassium	10 drachms.

Dissolve the iodide of potassium in ten ounces of water, and pour gradually into the mercurial solution until the precipitate thrown down is *nearly* redissolved. Add one ounce of hyposulphite of soda in crystals.

ANOTHER.

Mercury bichloride	60 grains in 4 ounces water.
Iodide of potassium	90 ,, ,, 2 ,, ,,
Hypo.	120 ,, ,, 2 ,, ,, Mix.

INTENSIFYING SOLUTIONS FOR GELATINE.

MR. WILLIAM ENGLAND'S.

Mecuric chloride	20 grains.
Ammonium chloride	20 ,,
Water	1 ounce.

Wash the negative thoroughly after fixing and apply the above until the film acquires a uniformly grey tint. Wash again and apply a very weak solution of ammonia, ten drops of the latter to an ounce of water.

AN INTENSIFIER WITH CYANIDE OF SILVER.

Mr. J. E. Thompson gives the following in The British Journal of Photography:—After fixing and washing the plate well, place it in a solution of bichloride of mercury ten grains, chloride of ammonium ten grains, water one ounce, for a few seconds, until it bleaches. Then wash and place in a bath of cyanide of silver until it blackens, made as follows:—

Cyanide of potassium	2 ounces.
Distilled water	48 ,,
Nitrate of silver	1 ounce.
Distilled water	6 ,,

Pour the silver gradually into the cyanide, stirring with a glass rod. The quantities given are about right to form a precipitate which will redissolve afterwards. To be used when a few days' old.

MR. J. DUDLEY RADCLIFFE'S.

Sulphate of iron and ammonia	1 ounce.
Lump sugar	1 ,,
Glacial acetic acid	2 ounces.
Albumen	1 ounce.
Distilled water	20 ounces.

Add the albumen last.

A few drops of a twenty-grain solution of silver nitrate are added at the time of using.

MESSRS. WRATTEN AND WAINWRIGHT'S.

A.

Protosulphate of iron	15 grains.
Gelatino-acetic acid solution (as described below)	40 drops.
Water	1 ounce.

B.

Nitrate of silver	10 grains.
Glacial acetic acid	10 drops.
Water	1 ounce.

The gelatino-acetic acid solution is compounded as under :—

Gelatine	15 grains.
Glacial acetic acid	3 drachms.
Water	5 ,,

It is as well to prepare a stock of this and also of A, as they are both better for keeping.

First flood the plate with water, and then with a solution of iodine and iodide of potassium of the colour of *pale* sherry for one minute ; rinse it off and apply enough of A to cover the plate for the same time. Now drop into the cup a drachm of B, and bring the A back from the plate to the cup to mix them together. Re-apply and keep moving over the surface until density is sufficient. If any air-bells should occur they must be kept moving, and then they will do no harm.

FORMULÆ FOR SILVER INTENSIFICATION.

Pyrogallic Solution.

Pyro.	15 grains.
Water	10 ounces.

Silver Solution.

Nitrate of silver	60 grains.
Citric acid	30 ,,
Nitric acid	30 minims.
Water	2 ounces.

To each ounce of the pyro. solution add ten or fifteen minims of the acid silver, having previously thoroughly removed the hypo. from the plate by prolonged washing or by the use of the alum and hydrochloric solution. Should the shadows of the negative become stained during intensification the solution of alum and acid will subsequently clear them almost instantaneously unless the stain be due to the imperfect removal of the hypo. It must be borne in mind that the density increases greatly no drying the negative.

To Restore Faded Negatives.

Mr. W. C. Debenham recommends the following solution for the purpose of restoring printing force to negatives which have faded after mercurial intensification :—

Schlippes' salt	10 grains.
Water	1 ounce.

Wet the film thoroughly by soaking in a dish of water, and immerse in the restoring solution until the desired effect is obtained.

To Remove the Last Traces of Hypo. from the Film.

Captain Abney recommends the following :—

Peroxide of hydrogen (twenty vols.)	1 drachm.
Water	5 ounces.

After washing the negative well it is immersed for a couple of minutes in the solution and again rinsed in water, when the intensification with silver can be at once proceeded with.

ANOTHER.

Where peroxide of hydrogen is not obtainable the following may be used as a substitute, the solution containing that substance in combination with others :—

Barium dioxide	1 ounce.
Glacial acetic acid	1 ,,
Water	4 ounces.

Reduce the barium dioxide to a fine powder and add it gradually to the acid and water, shaking until dissolved. A few minutes' immersion in this solution will effectually remove or destroy the last traces of hypo.

ANOTHER.

A simple plan brought forward by Captain Abney for this specific purpose consists in employing a saturated solution of alum in place of the solution of hydroxyl or peroxide of hydrogen.

COLONEL WORTLEY'S COLLO RESTRAINER.

Gelatine .... 3 drachms.

Soak in water for twenty-four hours; drain off water thoroughly and add—

Sulphuric acid .... 7 drachms.

When cold add water seven ounces. Neutralise with liquor ammonia (it will take about two ounces), then add—

Glycerine .... $4\frac{1}{2}$ ounces.

EAU DE JAVELLE.

Dry chloride of lime (hypochlorite of lime)	2 ounces.
Carbonate of potash	4 ,,
Water	40 ,,

Mix the chloride of lime with thirty ounces of the water; dissolve the carbonate of potash in the remainder. Mix, boil, and filter.

LABARRAQUE'S SOLUTION.

Chloride of lime	2 ounces.
Carbonate of soda	4 ,,
Water	40 ,,

Mix the coloride of lime with thirty ounces of the water, and dissolve the carbonate of soda in the remainder. Mix, boil, and filter.

CLEARING SOLUTIONS FOR GELATINE NEGATIVES.

MR. J. COWELL'S.

Alum	2 ounces.
Citric acid	1 ounce.
Water	10 ounces.

Wash moderately after fixing, and immerse the negative in the above.

ANOTHER.

Saturated solution of alum	20 ounces.
Hydrochloric acid (commercial)	1 ounce.

Immerse the negative after fixing, having previously washed it for two or three minutes under the tap; wash well after removal from the alum and acid.

PATENTS CONNECTED WITH THE PHOTOGRAPHIC ART APPLIED FOR DURING 1881.

A. M. Clark; a communication from L. Corbrassiere dit Christian and A. Liebert, both of Paris, France: Improvements in Photographic and other Chemical Printing. No. 10, dated January 1.—H. H. Harris; a communication from M. M. Goldstein, Vienna, Austria: Improved Devices or Apparatus to be Attached to the Walls of Apartments for Holding or Securing Pictures and the Like. No. 24, dated January 3. —F. H. Wenham, London: Improvements in Microscopes. No. 151, dated January 12.—J. B. Orr, London: Improvements in the Manufacture of Pigments for Oil and Distemper Painting. No. 328, dated January 25.—H. Chameray, Paris: Improvements in Electro-Photographical Receivers for Telegraphs. No. 579, dated February 10.—J. C. Mewburn; a communication from A. Gutmann, Paris: Improvements in the Art of Painting in Oil upon Fabrics. No. 664, dated February 16.—G. P. Alexander; a communication from A. L. Laverne, Paris: Improvements in Phantasmagoria or Magic Lanterns. No. 718, dated February 19.—J. D. Sprague, London: Improvement in Lines or Cords for Suspending Pictures. No. 600, dated February 11.—C. D. Abel; a communication from A. Loisseau and J. B. Germeuil-Bonnaud, both of Paris: Improvements in Opera and Field Glasses and Glasses of a Similar Character for rendering them applicable as Photographic Apparatus, and in Appliances used in combination therewith. No. 775, dated February 23.—F. A. C. Koenemann, London and Cologne: Immprovements in the Manufacture or Ornamentation of Picture Frames. No. 1174, dated March 17.—R. Sherwin and G. Evans, both of Worcester: Improvements in Apparatus for Holding Photographic or other Pictures or Objects. No. 1214, dated March 19.—Leon Warnerke, Surrey: Improvements in, and Applicable to, Photography. No. 1436, dated April 1.—E. Edwards, London: Improvements in Apparatus used by Photographers for Supporting the Head and Body. No. 1517, dated April 7.—H. J. Hadden; a communication from J. J. D. Hutinet and P. E. Lamy, both of Paris: Improvements in the Treatment of Paper for Photographic Purposes. No. 1538, dated April 8.—A. Pumphrey, Birmingham: Improvements in Supports to be used in place of Glass for Supporting Photographic Films. No. 1559, dated April 9.—H. A. Steinheil, Munich, Germany: Improvements in Photographic Objectives. No. 1602, dated April 12.—F. H. Bailey, Michigan, United States: Improvements in Astral Lanterns. No. 1604, dated April 12 (complete patent).—F. Hurter, Widnes, Lancashire: Improvements in Photometers, or Actinometers, or Instruments for Measuring Light. No. 1715, dated April 23.—S. Posen, of the firm of E. Posen and Co., Offenbach-on-the-Maine, Germany: Improvements in Fastenings for Albums, Scrap-books, and the like. No. 1989, dated May 7.—W. H. Beck, London; a communication from P. Piquepé, of Paris: A New or Improved Printing Frame for Obtaining Photographic Prints. No. 2142, dated May 17.—F. A. Bonneville, Paris; a communication from W. H. Guillebaud, of Marion, New Jersey, United States: Certain Improvements in Printing Photographs in Relief. No. 2381, dated May 31.—Captain J. B. Holroyde, Warley, near Halifax: An Improvement in the Mode of Taking Photographic Negatives, whereby they are Rendered Flexible, and the Use of Glass is Dispensed with. No. 2526, dated June 10.—C. Sands, London: An Improved In-

stantaneous Photographic Shutter. No. 2783, dated June 25.—G. SMITH London: Improvements in Photographic Cameras, and in Supports for the Same, Parts of which Improvements are also Applicable to Other Purposes. No. 3014, dated July 8.—D. BOGUE and B. C. LE MOUSSU: A New or Improved Method of and Means or Apparatus for preparing Drawing or Transfer Paper with a Tinted or Embossed Surface, for Use in Lithography, Photolithography, Photography, and Zincography, and in the Production of Raised Surface Blocks. No. 3570, dated August 17.—H. J. HADDAN, London; a communication from J. Lefeuvrier, Merdrignac, France: Improvements in Photographic Apparatus. No. 3628, dated August 20.—P. M. JUSTICE; a communication from J. Dewe, Ottowa, Canada: Improvements in the Preparation of Photographic Pictures, and Apparatus for Exhibiting the Same. No. 3664, dated August 23.—A. M. CLARK, London; a communication from A. Michaud, Paris, France: Improvements in Processes for Chemical and Physical Engraving by Means of Photography, in the Manufacture of Plates for Use in such Processes, and in Apparatus Employed in Connection Therewith. No. 3732, dated August 26.—W. BROOKES, Manchester: A New or Improved Portable or Pocket Photographic Camera. No. 4320, dated October 4.—A. COWAN, London: Improved Apparatus for Use in Cutting Glass for Photographic Purposes. No. 4322, dated October 5.—C. SANDS, London: Improved Photographic Changing Box. No. 4323, dated October 5.—N. LAZARUS, London: Improvements in the Manufacture of Achromatic Lenses. No. 4339, dated October 5.—R. LOVE, London: An Improved Device for Holding and Exhibiting Photographs. No. 4374, dated October 8.—E. DE PASS; a communication from W. H. Guillebaud, Paris: Improved Processes of Obtaining Bas-Relief Metal Casts, Dies, Matrices, and the Like by Photographic Means, and in Apparatus to be Employed in such Purpose. No. 4394, dated October 10.—E. G. BREWER; a communication from P. Boca, Paris: A New or Improved Chronometrical Obturator for Use in Photography. No. 4822, dated November 3.—T. BOLAS, Chiswick, Middlesex: Improvements in Photographic Cameras. No. 4823, dated November 3.—J. PLENER, London: Improvements in the Preparation of Photographic Emulsions. No. 4896, dated November 8.—W. W. BAGGALLY, London: An Improved Apparatus for Producing Optical Illusions. No. 4933, dated November 10. A. PUMPHREY, Birmingham: Improvements in Photographic Camera Obscuras, and in Appa ratus Used in connection therewith. No. 4967, dated November 12.—A. M. CLARK; a communication from E. Enjalbert, Montpellier, France: Improvements in Photographic Cameras. No. 4970, dated November 12.

RATES OF POSTAGE FOR INLAND LETTERS.

THE rates of postage to be prepaid are as follow, viz.:—

For a letter not exceeding		1 oz.					1d.
,,	exceeding	1 oz.,	but not exceeding		2 oz.		1½d
,,	,,	2 ,,	,,	,,	4 ,,		2d.
,,	,,	4 ,,	,,	,,	6 ,,		2½d.
,,	,,	6 ,,	,,	,,	8 ,,		3d.
,,	,,	8 ,,	,,	,,	10 ,,		3½d.
,,	,,	10 ,,	,,	,,	12 ,,		4d.

A letter exceeding the weight of 12 ozs. is liable to a postage of 1d. for every ounce, beginning with the first ounce. A letter, for example, weighing between 14 and 15 ozs., must be prepaid 15d.

Weights and Measures.

APOTHECARIES' WEIGHT.

SOLID MEASURE.

20 Grains	= 1 Scruple	=	20 Grains.
3 Scruples	= 1 Drachm	=	60 „
8 Drachms	= 1 Ounce	=	480 „
12 Ounces	= 1 Pound	=	5760 „

	FLUID.	Symbol.
60 Minims	= 1 Fluid Drachm	f. ʒ
8 Drachms	= 1 Ounce	f.
20 Ounces	= 1 Pint	O ℥
8 Pints	= 1 Gallon	gall.

The above weights are those usually adopted in formulæ.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

$27\frac{11}{32}$ Grains	= 1 Dram	=	$27\frac{11}{32}$ Grains,
16 Drams	= 1 Ounce	=	$437\frac{1}{2}$ „
16 Ounces	= 1 Pound	=	7000 „

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains	= 1 Pennyweight	=	24 Grains.
20 Pennyweights	= 1 Ounce	=	480 „
12 Ounces	= 1 Pound	=	5760 „

NOTE.—An ounce of *metallic* silver contains 480 grains, but an ounce of *nitrate* of silver contains only $437\frac{1}{2}$ grains.

FRENCH WEIGHTS AND MEASURES,

AND THEIR EQUIVALENTS IN ENGLISH.

1 Cubic Centimètre	= 17 minims nearly.
$3\frac{1}{2}$ „ „	= 1 drachm.
28·4 „ „	= 1 ounce.
50 „ „	= 1 ounce 6 drachms 5 minims.
100 „ „	= 3 ounces 4 drachms 9 minims.
1000 „ „ or 1 litre, = to 61 cubic inches	= 35 ounces 1 drachm 36 minims.

The unit of French liquid measures is a cubic *centimètre*.

A cubic *centimètre* of water measures nearly 17 minims (16·896); it weighs 15·4 grains, or 1 *gramme*. A cubic *inch* of water weighs 252·5 grains.

The unit of French weights is the gramme = to 15·4 grains; thus a drachm (60 grains) is nearly 4 grammes (3·88). An easy way to convert grammes into English weight is to divide the sum by 4, which gives the equivalent in drachms very nearly thus:—

Grammes.				Drachms.		Oz.		Drchm.		Grains.
100	÷	4	=	25	=	3	.	1	+	43

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

WITH a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognised style will find their labours materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalents.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$
Ammonium bromide ..	98	1·734	·576	1·918	·521	
Potassium ,, ..	119·1	1·427	·700	1·578	·633	
Sodium ,, ..	103	1·650	·606	1·825	·548	
Cadmium ,, com.	344*	·988	1·012	1·093	·915	1·106
,, ,, anh.	272*	1·25	·800	1·382	·723	
Zinc ,, ..	225·2*	1·509	·663	1·670	·600	
Ammonium chloride ..	53·5	3·177	·315	2·682	·373	·844
Sodium ,, ..	58·5	2·906	·344	2.453	·408	
Ammonium iodide ..	145	1·172	·853	1·620	·617	
Potassium ,, ..	166·1	1·023	·977	1·415	·707	1·382
Sodium ,, ..	150	1·133	·882	1·566	·638	
Cadmium ,, ..	366*	·929	1·076	1·284	·778	

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:—

Bromide of potassium	150 grains.
Iodide of potassium	10 ,,
Chloride of ammonium............................	10 ,,
Gelatine	200 ,,

Now we want to know how much silver nitrate should be employed in sensitising this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:—

Potassium bromide	$150 \times 1·427 = 214$	Weight of silver nitrate required,
,, iodide	$10 \times 1·023 = 10·23$	
Chloride of ammonium ..	$10 \times 3·177 = 31·77$	

or the total quantity of silver nitrate required for full conversion .... } 256·00 grains.

* These salts combine with two equivalents of silver nitrate, so that practically the real equivalent is one-half that given.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide. (Coml.)	Cadmium Bromide. (Anhyd.)	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide......	1	·823	·951	·57	·72	·87	1·832	1·675	·676	·59	·653	·535
Potassium ,, ...	1·215	1	1·156	·692	·876	1·058	2·226	2·036	·821	·717	·794	·651
Sodium ,, ...	1·051	·865	1	·599	·757	·915	1·925	1 761	·71	·62	·686	·563
Cadmium ,, com.	1·755	1·444	1·67	1	1·265	1·527	3·215	2·94	1·186	1·035	1·146	·94
,, ,, anh.	1·387	1·141	1·32	·79	1	1·207	2·542	2·324	·938	·819	·906	·743
Zinc ,, ...	1·149	·945	1·093	·655	·828	1	2·104	1·925	·776	·678	·75	·615
Ammonium chloride......	·546	·449	·519	·311	·393	·475	1	·914	·369	·322	·356	·292
Sodium ,, ...	·597	·491	·568	·34	·43	·519	1·093	1	·403	·352	·39	·319
Ammonium iodide	1·479	1·217	1·408	·843	1·066	1·287	2·712	2·478	1	·873	·966	·792
Potassium ,, ...	1·695	1·394	1·612	·965	1·221	1·475	3·104	2·839	1·145	1	1·107	·907
Sodium ,, ...	1·53	1·259	1·456	·872	1·103	1·332	2·803	2·564	1·034	·903	1	·819
Cadmium ,, ...	1·867	1·536	1·776	1·064	1·345	1·625	3·42	3·128	1·262	1·102	1·22	1

TABLE No. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide we take the number in the same column which stands against the latter salt in the margin, viz., 1·215; that is to say, 1·215 grain of potassium bromide will be required to do the same work as one.

FRENCH FLUID MEASURES.

THE cubic centimètre usually represented by "c. c." is the unit of the French measurement for liquids. It contains nearly seventeen minims of water; in reality, it contains 16·896 minims. The weight of this quantity of water is one gramme. Hence it will be seen that the cubic centimètre and the gramme bear to each other the same relation as our drachm for solids and the drachm for fluids, or as the minim and the grain. The following table will prove to be sufficiently accurate for photographic purposes:—

1 cubic centimètre	=	17 minims (as near as possible).								
2 cubic centimètres	=	34	"							
3 "	=	51	"							
4 "	=	68	"	or 1 drachm	8 minims.					
5 "	=	85	"	" 1	"	25	"			
6 "	=	102	"	" 1	"	42	"			
7 "	=	119	"	" 1	"	59	"			
8 "	=	136	"	" 2 drachms		16	"			
9 "	=	153	"	" 2	"	33	"			
10 "	=	170	"	" 2	"	50	"			
20 "	=	340	"	" 5	"	40	"			
30 "	=	510	"	" 1	ounce	0	drachm	30	minims.	
40 "	=	680	"	" 1	"	3	drachms	20	"	
50 "	=	850	"	" 1	"	6	"	10	"	
60 "	=	1020	"	" 2	ounces	1	"	0	"	
70 "	=	1190	"	" 2	"	3	"	50	"	
80 "	=	1360	"	" 2	"	6	"	40	"	
90 "	=	1530	"	" 3	"	1	"	30	"	
100 "	=	1700	"	" 3	"	4	"	20	"	

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHT.

ALTHOUGH a gramme is equal to 15·4346 grains, the decimal is one which can never be used by photographers; hence in the following table it is assumed to be $15\frac{2}{5}$ grains, which is the nearest approach that can be made to *practical* accuracy:—

1 gramme	=	$15\frac{2}{5}$	grains.					
2 grammes	=	$30\frac{4}{5}$	"					
3 "	=	$46\frac{1}{5}$	"					
4 "	=	$61\frac{3}{5}$	"	...... or	1	drachm	$1\frac{3}{5}$	grain.
5 "	=	77	"	...... "	1	"	17	grains.
6 "	=	$92\frac{2}{5}$	"	...... "	1	"	$32\frac{2}{5}$	"
7 "	=	$107\frac{4}{5}$	"	...... "	1	"	$47\frac{4}{5}$	"
8 "	=	$123\frac{1}{5}$	"	...... "	2	drachms	$3\frac{1}{5}$	"
9 "	=	$138\frac{3}{5}$	"	...... "	2	"	$18\frac{3}{5}$	"
10 "	=	154	"	...... "	2	"	34	"
11 "	=	$169\frac{2}{5}$	"	...... "	2	"	$49\frac{2}{5}$	"
12 "	=	$184\frac{4}{5}$	"	...... "	3	"	$4\frac{4}{5}$	"
13 "	=	$200\frac{1}{5}$	"	...... "	3	"	$20\frac{1}{5}$	"
14 "	=	$215\frac{3}{5}$	"	...... "	3	"	$35\frac{3}{5}$	"
15 "	=	231	"	...... "	3	"	51	"
16 "	=	$246\frac{2}{5}$	"	...... "	4	"	$6\frac{2}{5}$	"
17 "	=	$261\frac{4}{5}$	"	...... "	4	"	$21\frac{4}{5}$	"
18 "	=	$277\frac{1}{5}$	"	...... "	4	"	$37\frac{1}{5}$	"
19 "	=	$292\frac{3}{5}$	"	...... "	4	"	$52\frac{3}{5}$	"
20 "	=	308	"	...... "	5	"	8	"
30 "	=	462	"	...... "	7	"	42	"
40 "	=	616	"	...... "	10	"	16	"
50 "	=	770	"	...... "	12	"	50	"
60 "	=	924	"	...... "	15	"	24	"
70 "	=	1078	"	...... "	17	"	58	"
80 "	=	1232	"	...... "	20	"	32	"
90 "	=	1386	"	...... "	23	"	6	"
100 "	=	1540	"	...... "	25	"	40	"

THERMOMETRIC TABLES,

Showing the Assimilation of the Thermometers in Use Throughout the World.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80·0	212·0	49	39·2	120·2
99	79·2	210·0	48	38·4	118·4
98	78·4	208·4	47	37·6	116·6
97	77·6	206·6	46	36·8	114·8
96	76·8	204·8	45	36·0	113·0
95	76·0	203·0	44	35·2	111·2
94	75·2	201·2	43	34·8	109·4
93	74·4	199·4	42	33·6	107·6
92	73·6	197·6	41	32·8	105·8
91	72·8	195·8	40	32·0	104·0
90	72·0	194·0	39	31·2	102·2
89	71·2	192·2	38	30·4	100·4
88	70·4	190·4	37	29·6	98·6
87	69·6	188·6	36	28·8	96·8
86	68·8	186·8	35	28·0	95·0
85	68·0	185·0	34	27·2	93·2
84	67·2	183·2	33	26·4	91·4
83	66·4	181·4	32	25·6	89·6
82	65·6	179·6	31	24·8	87·8
81	64·8	177·8	30	24·0	86·0
80	64·0	176·0	29	23·2	84·2
79	63·2	174·2	28	22·4	82·4
78	62·4	172·4	27	21·6	80·6
77	61·6	170·6	26	20·8	78·8
76	60·8	168·8	25	20·0	77·0
75	60·0	167·0	24	19·2	75·2
74	59·2	165·2	23	18·4	73·4
73	58·4	163·4	22	17·6	71·6
72	57·6	161·6	21	16·8	69·8
71	56·8	159·8	20	16·0	68·0
70	56·0	158·0	19	15·2	66·2
69	55·2	156·2	18	14·4	64·4
68	54·4	154·4	17	13·6	62·6
67	53 6	152·6	16	12·8	60·8
66	52·8	150·8	15	12·0	59·0
65	52·0	149·0	14	11·2	57·2
64	51·2	147·2	13	10·4	55·4
63	50·4	145·4	12	9·6	53·6
62	49·6	143·6	11	8·8	51·8
61	48·8	141·8	10	8·0	50·0
60	48·0	140·0	9	7·2	48·2
59	47·2	138·2	8	6·4	46·4
58	46·4	136·4	7	5·6	44·6
57	45·6	134·6	6	4·8	42·8
56	44·8	132·8	5	4·0	41·0
55	44·0	131·0	4	3·2	39·2
54	43·2	129·2	3	2·4	37·4
53	42·4	127·4	2	1·6	36·5
52	41·6	125·6	1	0·8	33.8
51	40·8	123·8	0	0·0	32·0
50	40·0	122·0			

TABLE FOR ENLARGEMENTS.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1 inches.	2 inches.	3 inches.	4 inches.	5 inches.	6 inches.	7 inches.	8 inches.
2	4 4	6 3	8 $2\frac{3}{4}$	10 $2\frac{1}{2}$	12 $2\frac{2}{5}$	14 $2\frac{1}{3}$	16 $2\frac{2}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{8}$	15 3	$17\frac{1}{2}$ $2\frac{11}{12}$	20 $2\frac{6}{7}$	$22\frac{1}{2}$ $2\frac{13}{16}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{4}$	18 $3\frac{3}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{4}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{12}$	28 4	$31\frac{1}{2}$ $3\frac{15}{16}$
4	8 8	12 6	16 $5\frac{1}{4}$	20 5	24 $4\frac{4}{5}$	28 $4\frac{2}{3}$	32 $4\frac{4}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{5}{8}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{16}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{6}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $7\frac{1}{3}$	$27\frac{1}{2}$ $6\frac{7}{8}$	33 $6\frac{1}{2}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{6}$	42 7	48 $6\frac{6}{7}$	54 $6\frac{3}{4}$
7	14 14	21 $10\frac{1}{2}$	28 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{6}$	56 8	63 $7\frac{7}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{3}{5}$	56 $9\frac{1}{3}$	64 $9\frac{1}{7}$	72 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{4}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration:—A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—$7\frac{1}{2}$. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2; and so on with any other numbers.

THE following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes :—

p = Principal focus.
F = Greater conjugate focus.
f = Lesser do. do.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versâ* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$

$$p = \frac{r\,(F + f)}{(r + 1)^2}$$

$$f = p\left(\frac{1 + r}{r}\right) = \frac{F + f}{r + 1}$$

$$F = p\,(r + 1) = rf$$

$$F + f = p \times \frac{(r + 1)^2}{r} = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F - p}{p} = \frac{p}{f - p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N.B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

NOTE.—In case the above may not be clear to some photographers, the following rules may be better understood :—

To find the principal focus of a lens *(p)*, focus a near object in the camera, and measure the distance between it and the ground glass *(F + f)* ; next find the proportion which any dimension in the object bears to the same dimension on the ground glass *(r)*. Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F + f$ by r, and divide the product by the square of a number greater by one than r, $(r + 1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus *(f)* (if p and r are known) multiply p by the sum of $r + 1$ and divide the product by r. Or divide $F + f$ by $r + 1$.

To find the greater conjugate focus *(F)* multiply p by $r + 1$. Or multiply f by r.

To find $F + f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F - p$ (the difference between F and p) by p. Or divide p by $f - p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture [to lens).

For example : focus an object which is five inches high, so that it is one inch high on the ground glass ; thus we know that $r = 5$. Next measure the distance between the object and the ground glass *(F + f)*, which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F + f = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 7\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{3}{4}$ inch diameter.

TABLE OF SYMBOLS OF THE MORE IMPORTANT COMPOUNDS USED IN PHOTOGRAPHY.

Name.	Symbol.	
Acid, Acetic (Cryst.)	$H, C_2 H_3 O_2$	60
,, Citric	$H_3, C_6 H_5 O_7 + H_2 O$	210
,, Formic	H, CHO_2	46
,, Gallic	$H, C_7 H_5 O_5$	170
,, Hydriodic	HI	128
,, Hydrobromic	$H Br$	81
,, Hydrochloric	$H Cl$	36·5
,, Hydrocyanic	$H CN$	27
,, Hydrosulphuric (Sulph. Hydro.)	$H_2 S$	34
,, Nitric	H, NO_3	63
,, Pyrogallic	$H_3 C_6 H_3 O_3$	126
,, Sulphuric	$H_2 SO_4$	98
,, Tannic	$H_4 C_{27} H_{18} O_{17}$	618
Alcohol	$C_2 H_6 O$	46
Ammoniacal Gas	NH_3	17
Ammonium, Bromide	$NH_4 Br$	98
Ammonium, Chloride	$NH_4 Cl$	53·5
Ammonium, Iodide	$NH_4 I$	145
Ammonium, Nitrate	NH_4, NO_3	80
Ammonium, Sulphydrate of	NH_4, HS	51
Ammonium, Sulphocyanide of	NH_4, CNS	76
Barium, Chloride (Cryst.)	$Ba, Cl_2 + 2 Aq$	244
Baryta, Nitrate of	$Ba, (NO_3)^2$	261
Benzole	$C_6 H_6$	78
Chloroform	CH, Cl_3	119·5
Cadmium, Bromide (Commer.)	$Cd, Br_2 + 4 H_2 O$	344
,, Iodide	$Cd I_2$	366
Calcium Bromide (Cryst.)	$Ca Br_2 + 4 Aq$	272
,, Chloride	$Ca Cl_2$	111
Ether	$C_4 H_{10} O$	74
Gold, Terchloride	$Au Cl_3$	302·5
Iron, Perchloride	$Fe_2 Cl_6$	325
,, Iodide	$Fe I_2$	310
,, Nitrate	$Fe (NO_3)^2 + 6 Aq$	288
,, Sulphate	$Fe SO_4 + 7 Aq$	278
,, Double Sulphate of Ammonia and	$Fe SO_4, (NH_4)^2 SO_4 + 6 Aq$	392
Lead, Acetate (Cryst.)	$Pb, (C_2 H_3 O_5)^2 + H_2 O$	343
,, Nitrate	$Pb, (NO_3)^2$	331
Lithium Iodide	$Li I$	134
Bromide	$Li Br$	87

TABLE OF SYMBOLS, &c.—Continued.

Name.	Symbol.	
*Mercury, Chloride (Corrosive Sublimate)	$Hg\ Cl_2$	271
*Mercury, Subchloride (Calomel)	$Hg_2\ Cl_2$	471
Potassium, Bichromate	$K_2\ Cr_2\ O_7$	294·6
,, Carbonate	$K_2\ CO_3$	138·2
,, Hydrate	$K\ OH$	56·1
,, Nitrate	$K\ NO_3$	101·1
,, Bromide	$K\ Br$	119·1
,, Chloride	$K\ Cl$	74·6
,, Cyanide	$K\ C\ N$	65·1
,, Iodide	$K\ I$	166·1
Silver, Acetate	$Ag\ C_2\ H_3\ O_2$	167
,, Bromide	$Ag\ Br$	188
,, Carbonate	$Ag_2\ CO_3$	276
,, Chloride	$Ag\ Cl$	143·5
,, Hyposulphite	$Ag_2\ S_2\ O_3$	328
,, Iodide	$Ag\ I$	235
,, Nitrate	$Ag\ NO_3$	170
,, Oxide	$Ag_2\ O$	232
,, Sulphide	$Ag_2\ S$	248
Sodium, Acetate (Cryst.)	$Na\ C_2\ H_3\ O_2 + 6\ Aq$	190
,, Carbonate (Cryst.)	$Na_2\ CO_3 + 10\ Aq$	286
,, Hyposulphite (Cryst.)	$Na_2\ S_2\ O_3 + 5\ Aq$	248
,, Nitrate	$Na\ NO_3$	85
,, Bromide	$Na\ Br$	103
,, Chloride	$Na\ Cl$	58·5
,, Iodide	$Na\ I$	150
Uranium, Nitrate	$(Ur\ O_2), (NO_3)^2 + 6\ Aq$	384
*Zinc, Bromide	$Zn\ Br_2$	225·2
* ,, Chloride	$Zn\ Cl_2$	136·2

For convenience in calculating the equivalents in emulsion formulæ, it may be stated that those haloid salts in this table which are prefixed by an * require *two* equivalents of silver nitrate to convert them.

Some examples illustrating the use of the above table, and of that immediately preceding, will not be out of place here.

$Zn\ Br_2$ reacts with 2 $Ag\ NO_3$ thus :—

$$Zn\ Br_2 + 2\ Ag\ NO_3 = 2\ Ag\ Br + Zn\ (NO_3)_2.$$

Or taking the numerical equivalents of the salts—225·2 parts of zinc bromide react with twice 170, or 340 of silver nitrate, giving 376 of silver bromide and 189·2 of zinc nitrate.

Now for an example of a simple reaction, in which one combining proportion of each reagent takes part in the decomposition :—$Ag\ NO_3 + K\ I = Ag\ I + K\ NO_3$. In a case of this kind the numbers of the second table require neither doubling nor alteration, both metals concerned being what chemists call "monads."

One more reaction of greater complexity than the first :—

$$F_2\ Cl_6 + 6\ Ag\ NO_3 = 6\ Ag\ Cl + Fe_2\ (NO_3)_6$$

In this case 325 of iron perchloride react with six times 170, or 1,020 parts of silver nitrate.

TABLE OF THE SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.

The following is a list of the elementary bodies at present known, the latest well-defined additions to the number being gallium and davyum:—

Name.	Symbol.	Atomic Weight.	Name.	Symbol.	Atomic Weight.
Aluminum	Al	27·4	Mercury (Hydrargyrum)	Hg.	200·0
Antimony (Stibium)	Sb.	122·0			
Arsenic	As.	75·0	Molybdenum	Mo.	96·0
Barium	Ba.	137·0	Nickel	Ni.	58·8
Bismuth	Bi.	210·0	Nitrogen	N.	14·0
Boron	B.	11·0	Osmium	Os.	199·2
Bromine	Br.	80·0	Oxygen	O.	16·0
Cadmium	Cd.	112·0	Palladium	Pd.	106·6
Cæsium	Cs.	133·0	Phosphorus	P.	31·0
Calcium	Ca.	40·0	Platinum	Pt.	197·0
Carbon	C.	12·0	Potassium (Kalium)	K.	39·1
Cerium	Ce.	92·0			
Chlorine	Cl.	35·5	Rhodium	Rh.	104·4
Chromium	Cr.	52·2	Rubidium	Rb.	85·4
Cobalt	Co.	58·8	Ruthenium	Ru.	104·4
Columbium (or Niobium)	Cb.	97·6	Selenium	Se.	79·4
			Silicium	Si.	28·0
Copper	Cu.	63·4	Silver (Argentum)	Ag.	108·0
Davyum	Da.	..	Sodium	Na.	23·0
Didymium	Di.	95·0	Strontium	Sr.	87·6
Erbium	E.	112·6	Sulphur	S.	32·0
Fluorine	Fl.	19·0	Tantalum	Ta.	182·0
Gallium	Ga.	68·0	Tellurium	Te.	128·0
Glucinum	Gl.	9·4	Thallium	Tl.	204·0
Gold (Aurum)	Au.	196·0	Thorium	Th.	231·5
Hydrogen	H.	1·0	Tin (Stannum)	Sn.	118·0
Iodine	I.	127·0	Titanium	Ti.	50·0
Iridium	Ir.	198·0	Tungsten (Wolfram)	W.	184·0
Iron (Ferrum)	Fe.	56·0			
Lanthanum	La.	93·6	Uranium	Ur.	120·0
Lead (Plumbum)	Pb.	207·0	Vanadium	V.	51·2
Lithium	Li.	7·0	Yttrium	Y.	61·7
Magnesium	Mg.	24·0	Zinc	Zn.	65·2
Manganese	Mn.	55·0	Zirconium	Zr.	89·6

THERMOMETER SCALES.

The zero of the Centigrade and of Reaumur's thermometer each corresponds to 32° Fahrenheit.

To convert degrees of Réaumur into equivalent degrees of Fahrenheit, multiply the degrees of Réaumur by 9, divide the product by 4, and add 32; the result will be the degrees of Fahrenheit. 9 Fahrenheit, 5 Centigrade, and 4 Réaumur are equivalents. In Wedgwood's pyrometer the zero commences at 1·077° Fahrenheit; and each degree, instead of being equal to 130° of Fahrenheit, as was supposed by its maker, is only equal to about 20°.

Easy Rules for the Reduction of Scales.

To convert Réaumur into Fahrenheit, multiply by 2·25, and add 32°.
To convert Centigrade into Fahrenheit, multiply by 1·8, and add 32°.

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THE

YEAR-BOOK OF PHOTOGRAPHY

AND

PHOTOGRAPHIC NEWS ALMANAC

FOR

1882,

EDITED BY H. BADEN PRITCHARD, F.C.S.,

Late Hon. Secretary of the Photographic Society of Great Britain.

CONTAINING

A COMPLETE CALENDAR FOR THE YEAR.

TOGETHER WITH

PHOTOGRAPHIC SOCIETIES—THEIR OFFICERS, DAYS OF MEETING, ETC.
FOREIGN PHOTOGRAPHIC JOURNALS.
ANNALS OF PHOTOGRAPHY FOR 1881.
THE GELATINE PROCESS.
THE COLLODION PROCESS.
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PHOTO-COLLOTYPE PROCESSES.
ALL ABOUT FERROTYPES.
EVERY-DAY EXPERIENCES.
STANDARD FORMULÆ.
HINTS ON PRINTING.
HINTS ON DEVELOPING.
HINTS ON INTENSIFYING.
HINTS ON LENSES.
HINTS ON LIGHTING.
HINTS ON POSING.
JOTTINGS
ORIGINAL ARTICLES BY THE ABLEST PHOTOGRAPHERS, ETC., ETC.,

FORMING

A COMPLETE EPITOME OF THE PRESENT STATE OF PHOTOGRAPHY.

WITH A PORTRAIT OF MUNGO PONTON.

LONDON:
PIPER & CARTER, 5, CASTLE STREET, HOLBORN, E.C

PREFACE.

The Editor's thanks are due to all who have given their kindly aid in making the present volume; his gratitude is none the less sincere because it is expressed in few words.

15th December, 1881.

ECLIPSES IN 1882.

In the year 1882 there will be two Eclipses only, both of the Sun; viz.:—

May 17.—Total, visible as a small partial eclipse in Europe. About London it will begin at 6h. 11m. a.m.; its greatest phase will be at 6h. 46m., and it will end at 7h. 23m. At Edinburgh it will begin 6h. 13m. a.m.; the middle at 6h. 40m.; and it will end at 7h. 8m., Edinburgh mean time. At Dublin it will begin at 5h. 55m. a.m.; the middle at 6h. 23m.; and it will end at 6h. 52m. Dublin mean time. At the time of the middle of the eclipse, less than one-fifth of the Sun's diameter will be observed at London, and at Edinburgh and Dublin, very little more than one-tenth will be observed.

November 10 *and* 11.—Annual, the central eclipse beginning Nov. 10 at 9h. 29m. p.m. in longitude 123¼ E. of Greenwich, and latitude 10½ S.; central ending Nov. 11 at 1h. 15m. a.m., in longitude 105¾ W. of Greenwich, and latitude 21¼ S.

Transit of Mercury across Sun's Disc.

December 6.—The external contact at ingress will be at 1h. 55m. 57s. p.m.; the internal contact at ingress will be at 2h. 16m. 18s. p.m.; the internal contact at egress will be at 7h. 51m. 46s. p.m.; and the last contact will be at 8h. 12m. 9s. p.m. The Sun sets on this day at 3h. 51m.

LAW SITTINGS.

Hilary	Begins	January	11	Ends	April	5
Easter	„	April	11	„	May	26
Trinity	„	June	6	„	August	8
Michaelmas	„	November	2	„	December	21

UNIVERSITY TERMS—Oxford.

Lent	Begins	January	14	Ends	April	1
Easter	„	April	12	„	May	26
Trinity	„	May	27	„	July	8
Michaelmas	„	October	10	„	December	17

The Act, July 8.

Cambridge.

Lent	Begins	January	13	Ends	March	31
Easter	„	April	14	„	June	23
Michaelmas	„	October	1	„	December	16

The Commencement, June 20.

CHRONOLOGICAL NOTES.

Golden Number	2	Roman Indiction	10
Epact	11	Dominical Letter	A
Solar Cycle	15	Julian Period	6595

JANUARY—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. H. M.	Moon. Sets. H. M.	High Water. Morn. H. M.	High Water. After. H. M.
1	S	1st SUNDAY AF. CHRISTMAS	8 8	3 59	1 44	5 20	11 33	—
2	M	Yorkshire Society	8 8	4 0	2 34	6 17	0 5	0 35
3	Tu	S. Lond. & Sheffield Socs.	8 8	4 2	3 31	7 5	1 0	1 22
4	W	Edin., Ben., & Bristol Socs.	8 8	4 3	4 33	7 44	1 48	2 9
5	Th	Glasgow & Dundee Socs.	8 8	4 4	5 38	8 16	2 28	2 45
6	F	EPIPHANY. Twelfth Day	8 7	4 5	6 44	8 42	3 4	3 20
7	S	Imp. Ord. Star of Ind. '78	8 7	4 6	7 49	9 4	3 38	3 56
8	S	1st SUNDAY AFTER EASTER	8 6	4 8	8 54	9 24	4 11	4 28
9	M	[on-Tyne Socs.	8 6	4 9	9 59	9 42	4 44	5 0
10	Tu	Great Britain & Newcastle-	8 5	4 10	11 5	10 0	5 15	5 32
11	W	Cheltnhm. Soc. (An. Mg.)	8 5	4 12	Morn	10 19	5 48	6 6
12	Th	Manch. & Bolton Socs.	8 4	4 13	0 12	10 39	6 26	6 46
13	F	Soc. of Ireland (An. Mg.)	8 3	4 15	1 21	11 3	7 10	7 33
14	S	Oxford Lent Term begins	8 2	4 16	2 31	11 33	8 1	8 33
15	S	2nd SUNDAY AFT. EPIPHANY	8 2	4 18	3 41	0 11	9 10	9 51
16	M	Jupiter sets 2h. 43 m. m.	8 1	4 19	4 48	1 1	10 30	11 8
17	Tu	Pole Star no. 5h. 27m. a.	8 0	4 21	5 49	2 3	11 45	—
18	W	M. E. Lacan d. 1879	7 59	4 23	6 41	3 17	0 18	0 47
19	Th	Copernicus b. 1473	7 58	4 24	7 23	4 39	1 14	1 40
20	F	Society of Ireland	7 57	4 26	7 57	6 5	2 4	2 27
21	S	Hny. Hallam (hist.) d. '59	7 56	4 27	8 25	7 31	2 50	3 13
22	S	3rd SUNDAY AFT. EPIPH.	7 54	4 29	8 50	8 55	3 35	3 59
23	M	Dk. of Edinburgh mar. '74	7 53	4 31	9 13	10 17	4 42	4 45
24	Tu	A. Black (pub.) d. 1874	7 52	4 33	9 37	10 37	5 7	5 27
25	W	Prs. Royal mar. 1858	7 51	4 34	10 2	Morn	5 50	6 12
26	Th	Liverpool & Oldham Socs.	7 49	4 36	10 31	0 53	6 34	6 58
27	F	Society of Ireland	7 48	4 38	11 4	2 5	7 24	7 53
28	S	Capitulation of Paris 1871	7 47	4 40	11 44	3 12	8 23	9 0
29	S	4th SUNDAY AFT. EPIPH.	7 45	4 42	0 31	4 12	9 44	10 28
30	M	Charles I. beheaded 1649	7 44	4 43	1 25	5 3	11 9	11 48
31	Tu	Length of Day 9h. 3m.	7 42	4 45	2 25	5 44	—	0 21

MOON'S PHASES.

Full Moon, 4th day, 10h. 59m. M. | *New Moon*, 19th day, 4h. 35m. A.
Last Quarter, 12th day, 3h. 47m. A. | *First Quarter*, 26th day, 7h. 45m. M.

MORNING AND EVENING STARS.

Mercury and Mars are evening stars throughout the month. The first in conjunction with the Sun and Moon, 6th and 20th ; second in conjunction with the Moon, 3rd and 30th.

Venus is a morning star. Conjunction with the Moon, 19th.

Jupiter and Saturn are evening stars throughout the month ; the first stationary on the 10th, in conjunction with the Moon on the 27th.

FEBRUARY—28 DAYS.

D M	D W	MEMORANDA.	Sun. Rises.	Sun. Sets.	Moon. Rises.	Moon. Sets.	High Water. Morn.	High Water. After.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	W	Edin., Benev., & Bris. Socs.	7 41	4 47	3 28	6 18	0 50	1 14
2	Th	S. Lond., Bolton, Glasgow,	7 39	4 49	4 33	6 46	1 35	1 56
3	F	[& Dundee Societies	7 38	4 51	5 39	7 10	2 15	2 31
4	S	Fair on Thames 1814	7 36	4 52	6 44	7 30	2 46	3 2
5	𝔖	Septuagesima Sunday	7 34	4 54	7 49	7 48	3 19	3 33
6	M	Yorkshire Society	7 33	4 56	8 54	8 7	3 48	4 3
7	Tu	Sheffield Society	7 31	4 58	10 0	8 26	4 19	4 33
8	W	Half-Quarter Day	7 29	5 0	11 7	8 46	4 49	5 5
9	Th	J. Michelet (hist.) d. 1874	7 26	5 2	Morn	9 8	5 19	5 35
10	F	Society of Ireland	7 24	5 3	0 15	9 34	5 50	6 9
11	S	Great Britain (An. Mtg.)	7 22	5 5	1 23	10 8	6 30	6 52
12	𝔖	Sexagesima Sunday.	7 20	5 7	2 30	10 50	7 17	7 48
13	M	[on-Tyne, & Man. Socs.	7 18	5 9	3 32	11 44	8 22	9 2
14	Tu	Great Britain, Newcastle-	7 16	5 11	4 27	0 50	9 49	10 34
15	W	Saturn souths 4h. 39m. a.	7 14	5 13	5 12	2 6	11 14	11 56
16	Th	Dr. Kane (Arc. exp.) d. '57	7 12	5 14	5 50	3 29	—	0 29
17	F	Michael Angelo d. 1566	7 10	5 16	6 22	4 55	0 58	1 22
18	S	Von Biela (ast.) d. 1856	7 8	5 18	6 49	6 22	1 48	2 11
19	𝔖	Quinquages. Shrove Sun.	7 6	5 20	7 14	7 48	2 33	2 55
20	M	Venus souths 0h. 16m a.	7 4	5 22	7 38	9 12	3 17	3 37
21	Tu	Shrove Tuesday	7 2	5 23	8 4	10 33	3 59	4 20
22	W	Ash Wednesday	7 1	5 25	8 33	11 50	4 42	5 3
23	Th	Liverpool & Oldham Socs.	7 0	5 27	9 5	Morn	5 23	5 45
24	F	Dr. Guthrie d. 1873	6 58	5 29	9 43	1 1	6 6	6 29
25	S	Sir C. Wren died 1723	6 56	5 31	10 29	2 4	6 52	7 19
26	𝔖	1st Sunday in Lent	6 54	5 32	11 22	2 58	7 50	8 24
27	M	Battle Mt. Majuba 1881	6 51	5 34	0 20	3 43	9 4	9 53
28	Tu	Lamartine died 1869	6 49	5 36	1 21	4 20	10 38	11 20

MOON'S PHASES.

Full Moon, 3rd day, 5h. 58m. M. | *New Moon*, 18th day, 2h. 50m. M.
Last Quarter, 11th day, 8h. 34m. M. | *First Quarter*, 24th day, 9h. 31m. A.

MORNING AND EVENING STARS.

Mercury, evening star most of the month; easterly elongation, the 6th; in perihelion, the 8th; stationary, 12th; conjunction with the Moon, 18th; conjunction with the Sun, 22nd.

Venus rises with the Sun, 1st; in aphelion, 6th; in conjunction with the Moon, 18th; conjunction with the Sun, 21st.

Mars, evening star throughout the month; stationary on the 2nd; conjunction with the Moon, 26th.

Jupiter, evening star throughout the month; in quadrature with the Sun, the 6th; in conjunction with the Moon on the 23rd.

MARCH—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises.	Sun. Sets.	Moon. Rises.	Moon. Sets.	High Water. Morn.	High Water. After
			H. M.	H. M.	H. M	H. M.	H. M.	H. M.
1	W	Edin., Ben., & Brist. Socs.	6 47	5 38	2 25	4 50	11 57	—
2	Th	S. Lond. & Bolton Socs.	6 45	5 39	3 30	5 15	0 27	0 53
3	F	Moon in Apogee 11h. m.	6 43	5 41	4 34	5 36	1 14	1 34
4	S	J. Timbs, F.S.A., d. 1875	6 41	5 43	5 40	5 56	1 53	2 9
5	S	2nd Sunday in Lent	6 40	5 45	6 45	6 15	2 24	2 38
6	M	Yorkshire Society	6 39	5 47	7 51	6 33	2 54	3 7
7	Tu	Sheffield Society	6 36	5 48	8 58	6 53	3 21	3 35
8	W	Volunteers inaug. 1860	6 34	5 50	10 5	7 15	3 49	4 5
9	Th	Mrs. Barbauld d. 1825	6 32	5 52	11 12	7 40	4 21	4 36
10	F	Society of Ireland	6 30	5 54	Morn	8 11	4 52	5 7
11	S	Sir J. Outram d. 1863	6 27	5 55	0 18	8 49	5 24	5 42
12	S	3rd Sunday in Lent	6 25	5 57	1 21	9 37	6 3	6 25
13	M	Emp. Rus. Assas. 1881	6 23	5 59	2 17	10 36	6 52	7 21
14	Tu	Great Britain & Newcastle-	6 21	6 0	3 4	11 45	7 56	8 35
15	W	[on-Tyne Socs.	6 18	6 2	3 44	1 2	9 23	10 12
16	Th	Saturn near Moon	6 16	6 4	4 17	2 24	10 55	11 33
17	F	St. Patrick	6 14	6 5	4 46	3 48	—	0 7
18	S	Prs. Louise b. 1848	6 12	6 7	5 12	5 13	0 36	1 2
19	S	4th Sunday in Lent	6 7	6 9	5 37	6 38	1 26	1 49
20	M	Sir I. Newton d. 1727	6 5	6 10	6 3	8 2	2 9	2 32
21	Tu	Princess Louise mar. 1871	6 2	6 12	6 31	9 23	2 53	3 14
22	W	Wm. I. of Prussia b. 1797	6 0	6 14	7 3	10 39	3 37	3 56
23	Th	Nat. Gallery fnd. 1824	5 58	6 16	7 40	11 48	4 18	4 38
24	F	Q. Elizabeth died 1603	5 56	6 17	8 24	Morn	5 0	5 19
25	S	Lady Day	5 53	6 19	9 15	0 48	5 39	6 3
26	S	5th Sunday in Lent	5 51	6 21	10 12	1 38	6 26	6 53
27	M	Alex. II. of Rus. bur. 1881	5 49	6 22	11 13	2 18	7 20	7 53
28	Tu	L'pool & Oldham Socs.	5 46	6 24	0 17	2 51	8 29	9 12
29	W	Albert Hall opened 1871	5 44	6 26	1 21	3 18	10 0	10 40
30	Th	Sicilian Vespers 1282	5 42	6 27	2 26	3 41	11 16	11 47
31	F	Camb. Lent Term ends	5 40	6 29	3 30	4 1	—	0 14

MOON'S PHASES.

Full Moon, 5th day, 0h. 40m. M. | *New Moon*, 19th day, 0h. 17m. A.
Last Quarter, 12th day, 9h. 28m. A. | *First Quarter*, 26th day, 1h. 33m. A.

MORNING AND EVENING STARS.

Mercury, morning star throughout the month; stationary, the 6th; conjunction with the Moon, 17th; and in aphelion, the 24th.

Venus, evening star throughout the month; conjunction with the Moon, 20th.

Mars, evening star throughout the month; conjunction with the Moon, 26th.

Jupiter, evening star throughout the month; conjunction with the Moon on the 23rd.

APRIL—30 DAYS.

D M	D W	MEMORANDA.	Sun Rises H. M.	Sun Sets H. M.	Moon Rises H. M.	Moon Sets H. M.	High Water Morn. H. M.	High Water After. H. M.
1	S	All Fools Day	5 37	6 30	4 35	4 20	0 39	0 59
2	S	PALM SUNDAY	5 35	6 32	5 41	4 39	1 17	1 33
3	M	Yorkshire Society	5 33	6 34	6 48	4 59	1 51	2 6
4	Tu	Sheffield Society	5 30	6 35	7 56	5 20	2 21	2 36
5	W	Edinb., Bris., & Ben. Socs.	5 28	6 37	9 4	5 45	2 51	3 6
6	Th	S. Lon., Bolt., Gls., & Dun.	5 26	6 39	10 11	6 14	3 22	3 38
7	F	GOOD FRIDAY [Socs.	5 24	6 41	11 14	6 50	3 55	4 12
8	S	J. G. Lough (sculp.) d. '76	5 22	6 42	Morn	7 35	4 30	4 47
9	S	EASTER SUNDAY	5 19	6 44	0 11	8 30	5 6	5 26
10	M	Easter Mon. Bk. Holiday	5 17	6 45	1 1	9 35	5 48	6 13
11	Tu	Great Britain & Newcastle-	5 15	6 47	1 42	10 47	6 40	7 12
12	W	[on-Tyne Socs.	5 13	6 49	2 17	0 4	7 46	8 24
13	Th	Glasgow & Manch. Socs.	5 10	6 50	2 46	1 25	9 7	9 53
14	F	Society of Ireland	5 8	6 52	3 12	2 47	10 32	11 7
15	S	Sir James Ross b. 1800	5 6	6 54	3 37	4 9	11 40	—
16	S	LOW SUNDAY	5 4	6 55	4 2	5 31	0 11	0 34
17	M	Easter Law Sittings beg.	5 2	6 57	4 28	6 53	0 59	1 24
18	Tu	Baron Liebig d. 1873	5 0	6 59	4 58	8 13	1 46	2 7
19	W	Earl Beaconsfield d. 1881	4 58	7 0	5 33	9 27	2 30	2 51
20	Th	Napoleon III. b. 1808	4 55	7 2	6 14	10 33	3 13	3 34
21	F	Duke of Sussex d. 1843	4 53	7 4	7 3	11 28	3 56	4 17
22	S	Relief of Ekowe 1879	4 51	7 5	7 59	Morn	4 37	4 58
23	S	2nd SUNDAY aft. EASTER	4 49	7 7	9 1	0 13	5 19	5 40
24	M	Daniel de Foe d. 1731	4 47	7 9	10 5	0 50	6 4	6 29
25	T	Princess Alice b. 1843	4 45	7 10	11 9	1 19	6 54	7 22
26	W	David Hume b. 1711	4 43	7 12	0 14	1 44	7 53	8 26
27	Th	L'pool & Oldham Socs.	4 41	7 14	1 19	2 5	9 4	9 46
28	F	Qn. proc. Emp. of Ind. '76	4 39	7 15	2 24	2 25	10 22	10 53
29	S	Czar of Russia b. 1818	4 37	7 17	3 29	2 44	11 23	11 49
30	S	3rd SUNDAY aft. EASTER	4 36	7 19	4 35	3 3	—	0 13

MOON'S PHASES.

Full Moon, 3rd day, 5h. 47m. A.
Last Quarter, 11th day, 6h. 30m. M.
New Moon, 17th day, 9h. 38m. A.
First Quarter, 25th day, 6h. 56m. M.

MORNING AND EVENING STARS.

Mercury, morning star throughout the month; conjunction with the Moon, 16th.

Venus, evening star throughout the month; conjunction with Moon, 18th; with Saturn, 19th; with Neptune, 21st.

Mars, evening star throughout the month; quadrature with the Sun, 2nd; conjunction with the Moon, 24th.

Jupiter, evening star throughout the month; conjunction with the Moon on the 20th.

MAY—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. H. M.	Moon. Sets. H. M.	High Water Morn. H. M.	High Water After. H. M.
1	M	Yorkshire Society	4 34	7 20	5 43	3 24	0 35	0 54
2	Tu	Sheffield Society	4 32	7 22	6 51	3 48	1 12	1 32
3	W	Edin., Brist., & Ben. Socs.	4 30	7 23	7 59	4 16	1 49	2 5
4	Th	S. Lon., Bolton, Glas., &	4 28	7 25	9 5	4 50	2 22	2 39
5	F	[Dundee Societies	4 26	7 27	10 6	5 33	2 57	3 14
6	S	Postage stamps introd. '40	4 25	7 28	10 59	6 25	3 34	3 53
7	S	4th Sunday after Easter	4 23	7 30	11 43	7 27	4 13	4 34
8	M	[Tyne Socs.	4 21	7 31	Morn	8 38	4 54	5 16
9	Tu	Gt. Brit. & Newcastle-on-	4 19	7 33	0 19	9 54	5 41	6 7
10	W	Manch. Soc. Sir J. F. W.	4 18	7 35	0 49	11 12	6 34	7 6
11	Th	[Herschel died 1871	4 16	7 36	1 15	0 31	7 39	8 12
12	F	Society of Ireland	4 15	7 38	1 40	1 50	8 50	9 29
13	S	Vaccination introd. 1796	4 13	7 39	2 4	3 10	10 5	10 38
14	S	5th S. aft. East. Rogat.	4 11	7 40	2 29	4 30	11 11	11 42
15	M	Kean died 1833	4 10	7 42	2 56	5 49	—	0 10
16	Tu	Vendôme Col. dest. 1871	4 9	7 44	3 28	7 5	0 35	1 2
17	W	Dr. Jenner b. 1749	4 7	7 45	4 6	8 14	1 28	1 51
18	Th	Ascension. Holy Thurs.	4 6	7 47	4 52	9 15	2 11	2 33
19	F	N. Hawthorne d. 1864	4 4	7 48	5 45	10 5	2 55	3 17
20	S	Columbus d. 1506	4 3	7 49	6 45	10 46	3 38	3 59
21	S	Sunday after Ascension	4 2	7 51	7 49	11 19	4 20	4 41
22	M	Length of Day 15h. 50m.	4 1	7 52	8 54	11 46	5 0	5 18
23	Tu	Mark Lemon d. 1870	3 59	7 54	10 0	Morn	5 39	6 2
24	W	Q. Victoria b. 1819	3 58	7 55	11 5	0 9	6 26	6 49
25	Th	Liverpool & Oldham Socs.	3 57	7 56	0 10	0 29	7 14	7 40
26	F	Easter Law Sittings end	3 56	7 57	1 15	0 48	8 9	8 41
27	S	Dk. of Cumberland b. '19	3 55	7 59	2 20	1 7	9 14	9 50
28	S	Pentecost. Whit Sun.	3 54	8 0	3 26	1 27	10 21	10 52
29	M	Whit Mon. Bank Hol.	3 53	8 1	4 34	1 49	10 21	11 47
30	Tu	Jupit. in conj. w. Sun 9h.	3 52	8 2	5 43	2 15	—	0 11
31	W	Chalmers died 1847	3 51	8 3	6 51	2 47	0 33	0 53

MOON'S PHASES.

Full Moon, 3rd day, 8h. 31m. M. | *New Moon,* 17th day, 7h. 33m. M.
Last Quarter, 10th day, 0h. 35m. A. | *First Quarter,* 25th day, 0h. 41m. M.

MORNING AND EVENING STARS.

Mercury, evening star throughout the month; conjunction with the Sun, 2nd; with Saturn and Neptune, 4th; in perihelion, 7th; conjunction with Jupiter and the Moon, 13th and 18th.

Venus, evening star throughout the month; conjunction with Jupiter and the Moon, 5th and 19th; in perihelion, 30th.

Mars, evening star throughout the month; in aphelion, 5th; conjunction with the Moon, 23rd.

JUNE—30 DAYS.

D M	D W	MEMORANDA.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. H. M.	Moon. Sets. H. M.	High Water. Morn. H. M.	High Water. After. H. M.
1	Th	S. Lon., Bolton, Glasgow,	3 50	8 5	7 55	3 27	1 16	1 37
2	F	[& Dundee Socs.	3 50	8 6	8 52	4 16	1 58	2 17
3	S	Empress Russia d. 1880	3 49	8 7	9 41	5 16	2 38	2 58
4	Ş	Trinity Sunday	3 48	8 8	10 20	6 26	3 17	3 40
5	M	[Sittings begin.	3 48	8 9	10 53	7 41	4 1	4 23
6	Tu	Sheffield Soc. Trin. Law	3 47	8 10	11 21	9 0	4 46	5 10
7	W	Edin., Bris., & Benv. Socs.	3 46	8 10	11 45	10 20	5 33	5 59
8	Th	Millais b. 1829	3 46	8 11	Morn	11 39	6 27	6 55
9	F	C. Dickens d. 1870	3 46	8 12	0 9	0 57	7 24	7 54
10	S	Crystal Palace op. 1854	3 45	8 13	0 33	2 15	8 25	8 59
11	Ş	1st Sunday after Trinity	3 45	8 14	0 59	3 33	9 36	10 9
12	M	Length of Day 16h. 27m.	3 45	8 14	1 28	4 49	10 40	11 15
13	Tu	Society of Great Britain	3 44	8 15	2 3	6 0	11 48	—
14	W	Sir C. Fox, C.E., d. 1874	3 44	8 16	2 44	7 3	0 19	0 45
15	Th	T. Campbell (poet) d. '44	3 44	8 16	3 33	7 57	1 11	1 36
16	F	Bat. of Quatre Bras, 1815	3 44	8 17	4 30	8 42	2 0	2 20
17	S	[Waterloo 1815	3 44	8 17	5 33	9 18	2 44	3 4
18	Ş	2 Sun. a. Trin. Battle of	3 44	8 17	6 39	9 48	3 22	3 44
19	M	Magna Charta signed 1215	3 44	8 18	7 45	10 12	4 4	4 22
20	Tu	Accession Q. Victoria	3 44	8 18	8 51	10 33	4 40	4 59
21	W	Proclamation	3 44	8 18	9 56	10 53	5 17	5 35
22	Th	Income Tax first imposed	3 45	8 18	11 1	11 12	5 54	6 16
23	F	[1842	3 45	8 18	0 5	11 31	6 36	6 57
24	S	Midsummer Day	3 45	8 19	1 10	11 52	7 20	7 45
25	Ş	3rd Sunday after Trinity	3 46	8 19	2 17	Morn	8 11	8 39
26	M	George IV. d. 1830	3 46	8 19	3 25	0 16	9 9	9 47
27	Tu	Buenos Ayres taken 1806	3 47	8 19	4 35	0 45	10 22	10 51
28	W	Q. Victoria crowned 1838	3 47	8 19	5 41	1 20	11 25	11 54
29	Th	Liverpool & Oldham Socs.	3 48	8 19	6 40	2 5	—	0 21
30	F	Great Comet 1861	3 48	8 18	7 37	3 0	0 46	1 9

MOON'S PHASES.

Full Moon,	1st day, 8h. 33m. A.	*New Moon,*	15th day, 6h. 33m. A.
Last Quarter,	8th day, 5h. 9m. A.	*First Quarter,*	23rd day, 6h. 1m. A.

MORNING AND EVENING STARS.

Mercury, evening star throughout the month; easterly elongation, 1st; stationary, 15th; conjunction with the Moon, 17th; in aphelion, 20th; conjunction with the Sun, 28th.

Venus, evening star throughout the month; conjunction with the Moon on the 18th.

Mars, evening star throughout the month; conjunction with Moon on the 20th

Jupiter rises with the Sun, 1st; conjunction with the Moon, 14th.

JULY—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. H. M.	Moon. Sets. H. M.	High Water. Morn. H. M.	High Water. After. H. M.
1	S	Prs. Alice married 1862	3 49	8 18	8 20	4 6	1 35	1 57
2	S	4 Sun. a. Trin. Geo. Gar-	3 50	8 18	8 55	5 22	2 19	2 41
3	M	[field shot at 1881	3 50	8 17	9 26	6 42	3 5	3 26
4	Tu	Sheffield Society	3 51	8 17	9 53	8 4	3 49	4 13
5	W	Edin., Brist., & Ben. Socs.	3 52	8 16	10 17	9 25	4 36	5 0
6	Th	Bolton, Glasgow, & Dun-	3 53	8 16	10 42	10 46	5 22	5 47
7	F	[dee Societies	3 54	8 15	11 7	0 5	6 11	6 37
8	S	Oxford Trin. Term ends	3 55	8 15	11 34	1 22	7 3	7 29
9	S	5th Sun. aft. Trin. Mid-	3 56	8 14	Morn	2 37	7 58	8 30
10	M	[summer Fire Ins. ceases	3 57	8 13	0 6	3 49	9 2	9 40
11	Tu	Peace of Villafranca 1859	3 58	8 13	0 43	4 54	10 17	10 54
12	W	J. A. Kinglake d. 1870	3 59	8 12	1 29	5 51	11 30	—
13	Th	Richard Cromwell d. 1712	4 0	8 11	2 22	6 39	0 4	0 34
14	F	Treaty of Berlin signed '78	4 1	8 10	3 20	7 18	1 0	1 26
15	S	St. Swithin	4 2	8 9	4 26	7 50	1 48	2 10
16	S	6th Sunday after Trinity	4 3	8 8	5 32	8 16	2 29	2 49
17	M	First No. *Punch* pub. '41	4 4	8 7	6 37	8 39	3 7	3 25
18	Tu	Venus near Moon	4 6	8 6	7 42	8 59	3 43	4 0
19	W	Mars near Moon	4 7	8 5	8 47	9 18	4 16	5 34
20	Th	Ld. Westbury d. 1873	4 8	8 4	9 52	9 37	4 50	5 6
21	F	Battle Bull's Run '61 ['79	4 10	8 3	10 57	9 57	5 23	5 40
22	S	Chas. Landseer, R.A., d.	4 11	8 2	0 2	10 19	5 57	6 15
23	S	7th Sunday after Trinity	4 12	8 1	1 8	10 45	6 35	6 56
24	M	Gibraltar taken 1704	4 14	8 0	2 15	11 16	7 20	7 44
25	Tu	J. Dibdin d. 1814	4 15	7 58	3 21	11 55	8 13	8 47
26	W	Atlantic cable laid 1866	4 16	7 56	4 24	Morn	9 24	10 5
27	Th	Liverpool and Oldham	4 18	7 54	5 21	0 44	10 42	11 19
28	F	[Societies	4 19	7 53	6 10	1 45	11 52	—
29	S	Wm. Wilberforce d. 1833	4 21	7 52	6 51	2 57	0 24	0 50
30	S	8th Sunday after Trinity	4 22	7 50	7 26	4 15	1 16	1 40
31	M	St. Helena discov. 1502	4 24	7 48	7 56	5 38	2 5	2 26

MOON'S PHASES.

Full Moon, 1st day, 6h. 8m. M. | *New Moon*, 15th day, 7h. 1m. M.
Last Quarter, 7th day, 9h. 52m. A. | *First Quarter*, 23rd day, 10h. 18m. M.
Full Moon 30th day, 2h. 2m. A.

MORNING AND EVENING STARS.

Mercury, morning star from middle of the month; stationary, 9th; conjunction with the Moon, 13th; westerly elongation, 20th.

Venus, evening star throughout the month; conjunction with the Moon, 18th; conjunction with Uranus, 30th.

Mars, evening star throughout the month; conjunction with the Moon, 19th conjunction with Uranus, 27th.

AUGUST—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises.	Sun. Sets.	Moon. Rises.	Moon. Sets.	High Water. Morn.	High Water. After.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	Tu	Sheffield Society	4 25	7 47	8 20	7 2	2 49	3 10
2	W	Edin., Brist., & Ben. Socs.	4 27	7 45	8 45	8 26	3 34	3 56
3	Th	Bolton, Glasgow, & Dun-	4 28	7 44	9 11	9 48	4 20	4 41
4	F	[dee Societies	4 30	7 42	9 39	11 8	5 4	5 26
5	S	Battle of Woerth 1870	4 31	7 40	10 10	0 26	5 49	6 11
6	S	9th Sunday after Trinity	4 33	7 38	10 47	1 40	6 37	7 2
7	M	Bank Holiday	4 34	7 37	11 30	2 47	7 30	8 0
8	Tu	Trinity Law Sittings end	4 36	7 35	Morn	3 46	8 33	9 11
9	W	Green. Observ. com. 1675	4 38	7 33	0 20	4 37	9 55	10 36
10	Th	[Days end	4 39	7 31	1 15	5 18	11 16	11 51
11	F	Half Quarter Day. Dog	4 41	7 29	2 17	5 52	—	0 24
12	S	Grouse Shooting begins	4 42	7 27	3 22	6 20	0 49	1 15
13	S	10th Sunday aft. Trinity	4 44	7 25	4 28	6 44	1 35	1 55
14	M	Lord Clyde died 1863	4 45	7 23	5 33	7 5	2 13	2 29
15	Tu	F. J. Lewis (artist) d. 1876	4 47	7 21	6 37	7 25	2 48	3 4
16	W	Pr. Albert of Prus. b. '62	4 49	7 19	7 42	7 44	3 18	3 33
17	Th	P. le Neve Foster b. 1809	4 50	7 17	8 46	8 4	3 50	4 5
18	F	Beattie d. 1803 [laid '79	4 51	7 16	9 51	8 25	4 20	4 37
19	S	Foundation Eddystone	4 53	7 14	10 55	8 49	4 51	5
20	S	11th Sunday aft. Trinity	4 55	7 12	0 1	9 17	5 22	5 37
21	M	Blackcock Shooting beg.	4 57	7 9	1 6	9 52	5 55	6 17
22	Tu	Bat. Bosworth Field 1485	4 59	7 7	2 8	10 35	6 38	7 2
23	W	Sir W. Herschel d. 1822	5 0	7 5	3 6	11 29	7 31	8
24	Th	Hook died 1841	5 1	7 3	3 57	Morn	8 41	9
25	F	Faraday d. 1867	5 3	7 1	4 40	0 33	10 9	10 49
26	S	Pr. Albert born 1819	5 5	6 59	5 18	1 47	11 28	—
27	S	12th Sunday aft. Trinity	5 6	6 57	5 52	3 7	0 2	0 29
28	M	Leigh Hunt died 1859	5 8	6 54	6 21	4 31	0 54	1 19
29	Tu	[(astronomer d. 1844	5 9	6 52	6 47	5 56	1 43	2 4
30	W	O. Sarony d. '79. F. Baily	5 11	6 50	7 13	7 21	2 28	2 50
31	Th	Liverpool & Oldham Socs.	5 12	6 48	7 41	8 45	3 12	3 35

MOON'S PHASES.

Last Quarter, 6th day, 4h. 13m. M.
New Moon, 13th day, 9h. 10m. A.
First Quarter, 22nd day, 0h. 55m. M.
Full Moon, 28th day, 9h. 19m. A.

MORNING AND EVENING STARS.

Mercury, morning star until middle of the month; in perihelion, 3rd; conjunction with Moon, 14th; conjunction with Sun, 15th; and with Uranus, 28th.

Venus, evening star throughout the month; conjunction with Mars, 2nd; and the Moon, 17th.

Mars, evening star throughout the month; conjunction with the Moon, 17th.

Jupiter, morning star throughout the month; conjunction with the Moon, 9th.

SEPTEMBER—30 DAYS.

D M	D W	MEMORANDA.	Sun. Rises.	Sun. Sets.	Moon. Rises.	Moon. Sets.	High Water. Morn.	High Water. After.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	F	Partridge Shooting com.	5 14	6 46	8 11	10 7	3 57	4 19
2	S	Fire of London 1666	5 16	6 43	8 46	11 24	4 41	5 3
3	𝔖	13th Sunday aft. Trinity	5 17	6 41	9 28	0 36	5 24	5 46
4	M	French Republic dec. '70	5 19	6 39	10 17	1 39	6 10	6 35
5	Tu	Sheffield Society	5 20	6 37	11 13	2 34	7 2	7 32
6	W	Edin., Brist., & Ben. Socs.	5 22	6 34	Morn	3 18	8 7	8 45
7	Th	Glasgow, Dundee, & Bolt.	5 24	6 32	0 14	3 53	9 31	10 17
8	F	[Societies	5 25	6 30	1 15	4 23	10 57	11 32
9	S	Bat. Flodden Field 1513	5 27	6 28	2 20	4 49	—	0 4
10	𝔖	14th Sunday aft. Trinity	5 28	6 25	3 25	5 11	0 31	0 53
11	M	Battle of Delhi 1858	5 30	6 23	4 29	5 31	1 13	1 33
12	Tu	Columbus disc. Am. 1492	5 32	6 21	5 33	5 51	1 50	2 5
13	W	Quebec taken 1759	5 33	6 18	6 36	6 11	2 21	2 35
14	Th	Manchester Society	5 35	6 16	7 41	6 32	2 49	3 5
15	F	Liverpool and Manchester	5 36	6 14	8 46	6 55	3 20	3 34
16	S	[Railway opened 1830	5 38	6 12	9 51	7 22	3 50	4 4
17	𝔖	15th Sun. aft. Trin. Fox	5 40	6 9	10 55	7 54	4 21	4 35
18	M	[Talbot d. 1877	5 41	6 7	11 56	8 33	4 53	5 7
19	Tu	President Garfield d. 1881	5 43	6 5	0 55	9 21	5 24	5 46
20	W	Battle of Alma 1854	5 44	6 2	1 48	10 19	6 8	6 32
21	Th	Scott died 1832	5 46	6 0	2 33	11 26	7 1	7 36
22	F	Delhi captured 1857	5 48	5 58	3 12	Morn	8 12	8 52
23	S	Autumn Quarter com.	5 49	5 55	3 45	0 40	9 44	10 25
24	𝔖	16th Sunday after Trinity	5 51	5 53	4 14	2 0	11 2	11 36
25	M	Ld. Mountmorres killed in	5 53	5 51	4 42	3 23	—	0 8
26	Tu	[Ireland 1880	5 54	5 48	5 9	4 47	0 33	0 57
27	W	Algiers bomb. 1816	5 56	5 46	5 37	6 12	1 21	1 43
28	Th	Liverpool & Oldham Socs.	5 57	5 44	6 7	7 37	2 4	2 26
29	F	Michaelmas Day	5 59	5 42	6 42	8 59	2 50	3 12
30	S	Saturn near Moon	6 1	5 39	7 23	10 16	3 33	3 54

MOON'S PHASES.

Last Quarter,	4th day, 1h. 26m. A.	*First Quarter,*	20th day, 1h. 28m. A.
New Moon,	12th day, 0h. 59m. A.	*Full Moon,*	27th day, 5h. 10m. M.

MORNING AND EVENING STARS.

Mercury, evening star throughout the month; conjunction with Moon, 14th; in aphelion, 16th; conjunction with Mars, 21st; easterly elongation, 28th.

Venus, evening star throughout the month; conjunction with Moon, 16th; in aphelion, 19th; easterly elongation, 26th.

Mars, evening star throughout the month; conjunction with the Moon, 15th.

Jupiter rises on the 1st; conjunction with the Moon, 5th; in quadrature with the Sun on 23rd.

OCTOBER—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises.	Sun. Sets.	Moon. Rises.	Moon. Sets.	High Water. Morn.	High Water. After.
			H. M.	H. M.	H. M.	H. M.	H. M	H. M.
1	S	17th Sunday after Trinity	6 2	5 37	8 8	11 25	4 17	4 38
2	M	Yorkshire Society	6 4	5 35	9 4	0 25	4 59	5 22
3	Tu	Sheffield Society	6 6	5 33	10 4	1 14	5 46	6 10
4	W	Edin.,Bris.,Ben.(An.Mtg.)	6 7	5 30	11 7	1 53	6 37	7 7
5	Th	S. Lon., Bolton, Glasgow,	6 9	5 28	Morn	2 25	7 40	8 16
6	F	[and Dundee Societies	6 11	5 26	0 11	2 52	8 59	9 44
7	S	Marshal Burgoyne d. '71	6 12	5 23	1 16	3 16	10 23	10 58
8	S	18th Sunday after Trinity	6 14	5 21	2 20	3 37	11 30	11 57
9	M	Dutch Fleet defeat. 1797	6 16	5 19	3 24	3 56	—	0 22
10	Tu	Newcastle-on-Tyne Soc.	6 17	5 17	4 28	4 16	0 42	1 2
11	W	Dr. E. Steinheil d. 1879	6 19	5 15	5 32	4 37	1 18	1 35
12	Th	Manchester Society	6 21	5 12	6 37	5 0	1 52	2 6
13	F	Society of Ireland	6 22	5 10	7 42	5 26	2 20	2 36
14	S	Michael. Fire Ins. ceases	6 24	5 8	8 47	5 57	2 52	3 6
15	S	19th Sunday aft. Trinity	6 26	5 6	9 50	6 34	3 22	3 38
16	M	Houses Parl. burnt 1834	6 27	5 4	10 49	7 19	3 55	4 10
17	Tu	Austrians vac. Lomb. '66	6 29	5 2	11 43	8 13	4 28	4 46
18	W	Lord Palmerstone died '65	6 31	5 0	0 29	9 15	5 3	5 25
19	Th	Sir C. Wheatstone d. '75	6 33	4 57	1 9	10 25	5 48	6 14
20	F	Battle of Navarino 1827	6 34	4 55	1 43	11 40	6 42	7 16
21	S	Battle of Trafalgar 1805	6 36	4 53	2 13	Morn	7 53	8 33
22	S	20th Sunday aft. Trinity	6 38	4 51	2 40	0 58	9 16	9 58
23	M	Merc. in inf. con. w. Sun	6 40	4 49	3 6	2 18	10 35	11 10
24	Tu	Hogarth d. 1764. [4 a.m	6 41	4 47	3 33	3 40	11 40	—
25	W	Battle Balaclava 1854	6 43	4 45	4 1	5 4	0 8	0 34
26	Th	Liverpool & Oldham Socs.	6 45	4 43	4 33	6 27	0 56	1 20
27	F	Sir H. Holland, M.D., d. '73	6 47	4 41	5 11	7 47	1 41	2 6
28	S	Sir F. Lycett d. 1880	6 49	4 39	5 57	9 2	2 27	2 51
29	S	21st Sunday aft. Trinity	6 50	4 37	6 50	10 9	3 13	3 34
30	M	Dr. Lancaster died 1874	6 52	4 35	7 49	11 4	3 57	4 19
31	Tu	All Hallows' Eve	6 54	4 34	8 53	11 49	4 39	5 1

MOON'S PHASES.

Last Quarter, 4th day, 2h. 17m. M. | *First Quarter,* 19th day, 11h. 55m. A.
New Moon, 12th day, 6h. 1m. M. | *Full Moon,* 26th day, 2h. 34m. A.

MORNING AND EVENING STARS.

Mercury, morning star near the end of the month; stationary, 11th and 31st; conjunction with Moon, 13th; with Sun, 23rd; in perihelion, 30th.

Venus, evening star throughout the month; in conjunction with the Moon on the 16th.

Mars, evening star throughout the month; conjunction with the Moon on 13th.

Jupiter, evening star throughout the month; conjunction with the Moon, 3rd, and 30th.

NOVEMBER—30 DAYS.

D M	D W	MEMORANDA.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. H. M.	MOON. Sets. H. M.	HIGH WATER. Morn. H. M.	HIGH WATER. After. H. M.
1	W	Edin., Ben., & Bris., Socs.	6 56	4 32	9 59	0 25	5 24	5 48
2	Th	S. Lond., Bolton, Glasgow,	6 57	4 30	11 5	0 54	6 12	6 39
3	F	[& Dundee Societies	6 59	4 28	Morn	1 19	7 7	7 39
4	S	G. Peabody d. 1869	7 1	4 26	0 10	1 41	8 12	8 49
5	S	22nd Sunday aft. Trinity	7 3	4 25	1 14	2 1	9 29	10 6
6	M	Yorkshire Society	7 5	4 23	2 18	2 21	10 40	11 12
7	Tu	Sheffield Society	7 6	4 21	3 22	2 42	11 38	—
8	W	Milton died 1674	7 8	4 20	4 26	3 4	0 2	0 24
9	Th	Manchester Society	7 10	4 18	5 31	3 29	0 43	1 3
10	F	Society of Ireland	7 12	4 16	6 36	3 58	1 20	1 36
11	S	Half-quarter Day	7 13	4 15	7 41	4 33	1 54	2 10
12	S	23rd Sunday aft. Trinity	7 15	4 13	8 43	5 16	2 26	2 42
13	M	Rossini d. 1868	7 17	4 12	9 39	6 8	3 0	3 17
14	Tu	Newcastle-on-Tyne, & Gt.	7 19	4 11	10 28	7 8	3 36	3 54
15	W	[Britain Societies	7 20	4 9	11 10	8 16	4 12	4 32
16	Th	Rubens b. 1577	7 22	4 8	11 46	9 29	4 52	5 14
17	F	Queen Elizabeth's Day	7 24	4 6	0 16	10 44	5 38	6 4
18	S	Sir D. Wilkie b. 1785	7 25	4 5	0 43	Morn	6 31	7 1
19	S	24th Sunday aft. Trinity	7 27	4 4	1 8	0 1	7 34	8 9
20	M	Berlin Decree, 1806	7 29	4 3	1 33	1 20	8 45	9 27
21	Tu	Prs. Royal b. 1840	7 30	4 2	2 0	2 40	10 1	10 37
22	W	Afghan Campaign, '78	7 32	4 0	2 29	4 0	11 9	11 40
23	Th	Mahommedan 1299	7 34	3 59	3 3	5 20	—	0 8
24	F	Sir H. Havelock died '57	7 35	3 58	3 44	6 37	0 34	1 0
25	S	Gov. Purch. Suez Canal '75	7 37	3 57	4 34	7 48	1 25	1 48
26	S	25th Sunday aft. Trinity	7 39	3 56	5 31	8 49	2 11	2 34
27	M	Kars surrendered '55	7 40	3 55	6 34	9 40	2 58	3 20
28	Tu	London Univ. fnd. 1832	7 42	3 55	7 41	10 21	3 41	4 3
29	W	*Times* printed by Stm. '14	7 43	3 54	8 48	10 54	4 23	4 44
30	Th	Liverpool & Oldham Socs.	7 45	3 53	9 55	11 21	5 4	5 24

MOON'S PHASES.

Last Quarter, 2nd day, 6h. 58m. A. | *First Quarter,* 18th day, 8h. 42m. M.
New Moon, 10th day, 11h. 20m. A. | *Full Moon,* 25th day, 2h. 3m. M.

MORNING AND EVENING STARS.

Mercury, morning star throughout the month; westerly elongation on the 8th; conjunction with the Moon on the 9th.

Venus, evening star throughout the month; in conjunction with the Moon on the 13th; and stationary on the 16th.

Mars, evening star throughout the month; conjunction with the Moon on the 11th.

Jupiter, evening star throughout the month; conjunction with the Moon on the 27th.

DECEMBER—31 DAYS.

D M	D W	MEMORANDA.	Sun. Rises.	Sun. Sets.	Moon. Rises.	Moon. Sets.	High Water. Morn.	High Water. After.
			H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	F	Princess of Wales b. 1844	7 46	3 53	11 0	11 45	5 48	6 9
2	S	Battle of Austerlitz '05	7 47	3 52	Morn	0 6	6 32	6 59
3	$	1st Sunday in Advent	7 49	3 51	0 4	0 25	7 24	7 50
4	M	Yorkshire Society	7 50	3 51	1 9	0 46	8 20	8 53
5	Tu	Sheffield Society	7 52	3 50	2 13	1 7	9 32	10 4
6	W	Edin., Benev., & Bris. Socs.	7 53	3 50	3 17	1 30	10 37	11 7
7	Th	S. Lond., March., Bolt.,	7 55	3 50	4 23	1 58	11 36	—
8	F	[Glas., & Dundee Socs.	7 56	3 49	5 28	2 31	0 0	0 25
9	S	Society of Ireland (8th)	7 58	3 49	6 31	3 11	0 45	1 6
10	$	2nd Sunday in Advent	7 59	3 49	7 30	4 0	1 28	1 47
11	M	Grouse Shooting ends	7 59	3 49	8 24	4 58	2 5	2 23
12	Tu	Great Britain & Newcastle-	8 0	3 49	9 10	6 5	2 42	3 2
13	W	[on-Tyne Socs.	8 0	3 49	9 48	7 18	3 21	3 41
14	Th	Prince Consort d. 1861	8 1	3 49	10 20	8 34	4 2	4 24
15	F	Agassiz died 1878	8 2	3 49	10 48	9 51	4 45	5 8
16	S	Cambridge Mich. Term e.	8 3	3 49	11 14	11 8	5 30	5 53
17	$	3rd Sunday in Advent	8 4	3 49	11 39	Morn	6 21	6 46
18	M	Dk. of Wellington bur. '52	8 4	3 49	0 4	0 26	7 15	7 44
19	Tu	Turner (painter) d. 1851	8 5	3 50	0 31	1 44	8 17	8 51
20	W	Lord Macaulay d. 1859	8 6	3 50	1 2	3 1	9 28	10 5
21	Th	Mich. Law Sittings end	8 6	3 50	1 39	4 17	10 39	11 16
22	F	"George Eliot" died '80	8 7	3 51	2 23	5 29	11 49	—
23	S	Pr. Consort bur. 1861	8 7	3 52	3 15	6 34	0 19	0 47
24	$	4th Sunday in Advent	8 7	3 52	4 15	7 30	1 13	1 39
25	M	Christmas Day	8 8	3 53	5 21	8 15	2 3	2 24
26	T	Bank Holiday	8 8	3 53	6 29	8 52	2 46	3 8
27	W	Hepworth Dixon died '79	8 8	3 54	7 36	9 22	3 26	3 48
28	Th	Oldham Society	8 8	3 55	8 43	9 48	4 8	4 27
29	F	Gladstone born 1809	8 9	3 56	9 49	10 10	4 44	5 3
30	S	Royal Society estab. 1660	8 9	3 57	10 54	10 31	5 21	5 39
31	$	1st Sunday aft. Christmas	8 9	3 58	11 57	10 51	5 58	6 18

MOON'S PHASES.

Last Quarter, 2nd day, 2h. 56m. A. | *First Quarter*, 17th day, 4h. 39m. A.
New Moon, 10th day, 3h. 38m. M. | *Full Moon*, 24th day, 3h. 41m. A.

MORNING AND EVENING STARS.

Mercury, evening star near end of the month; conjunction with Venus, 9th; conjunction with Moon, 10th—Mars, 15th—Sun, the 17th; in aphelion, the 13th.

Venus, morning star most of the month; conjunction with Mars, 5th—Moon, 10th; transit across Sun's disc, 6th; stationary, 26th.

Mars, sets, 1st; conjunction with Moon, 10th—Sun, 11th.

Photographic Societies.

THE PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.

(Originally the PHOTOGRAPHIC SOCIETY OF LONDON.)

ESTABLISHED 1853.

Patrons—HER MAJESTY THE QUEEN, & H.R.H. THE PRINCE OF WALES.

President—Jas. Glaisher, F.R.S., F.R.A.S., 1, Dartmouth Place, Blackheath, S.E.
Vice-Presidents—T. Sebastian Davis, F.C.S.; J. H. Dallmeyer, F.R.A.S.; Captain W. de W. Abney, R.E., F.R.S. *Treasurer*—John Spiller, F.C.S.
Council—Francis Bedford, Charles Bennett, W. Bedford, Valentine Blanchard, W. S. Bird, T. M. Brownrigg, W. B. Bolton, Lieut. L. Darwin, R.E., W. England, Payne Jennings, J. Hughes, P. Mawdsley, H. B. Pritchard, F.C.S., H. P. Robinson, Professor G. G. Stokes, M.A., D.C.L., F.R.S., Leon Warnerke, Col. H. Stuart Wortley, and F. York.
Hon. Secretary—Lieut. L. Darwin, R.E., Brompton Barracks, Chatham.
Assistant Secretary—Edwin Cocking, 57, Queen's Road, Peckham, S.E.

Meetings at the Gallery of the Society of Painters in Water Colours, 5A, Pall Mall East, at 8 p.m., the second Tuesday of each month from November to June inclusive. Annual Meeting February 14th.

Members have the privilege of introducing one Visitor on each evening of meeting; also free admission for themselves and friends to the Annual Exhibition.

SOUTH LONDON PHOTOGRAPHIC SOCIETY.

ESTABLISHED MAY 10th, 1859.

President—Rev. F. F. Statham, M.A., F.G.S., &c.
Vice-Presidents—W. Brooks, Frank Howard, T. Hughes, P. Mawdsley, and Edwin Cocking.
Committee—T. Bolas, W. B. Bolton, W. Cobb, A. Cowan, E. Dunmore, E. W. Foxlee, L. Warnerke, and G. F. Williams.
Hon. Treasurer—F. A. Bridge.
Secretary—H. Garrett Cocking, High Road, Lee, S.E.

This Society especially aims at Art cultivation in connection with Photography.

The Ordinary Meetings are held in the Rooms of the Society of Arts, John Street, Adelphi, on the first Thursday of every month, from October to June inclusive. A Technical Meeting, for the exhibition and explanation of novelties, is held in November. Annual Meeting in December.

GLASGOW PHOTOGRAPHIC ASSOCIATION.

President—John Urie.
Vice-Presidents—Councillor Robertson and James Paton.
Secretary—W. Craig Ramsay, 134, St. Vincent Street. *Treasurer*—George Bell.
Council—Dr. Fairlie, R. Stirling, J. Moran, J. M. Skinner, Hugh Reid, and T. Gilfillan. *Auditors*—Messrs. Parker and Mactear.

Usual Meetings of the Society on the first Thursday of the month, from September till April inclusive.

EDINBURGH PHOTOGRAPHIC SOCIETY.
ESTABLISHED 1861.

President—John Lessels. *Vice-Presidents*—J. Henderson and James Howie.
Hon. Secretary—M. G. Dobbie, 8, Rosehall Terrace, Dalkeith Road.
Hon. Treasurer—Hugh H. Pillans, 12, Dryden Place.
Hon. Corresponding Secretary—W. T. Bashford, Portobello, Edinburgh.
Hon. Lecturer—W. H. Davies. *Hon. Auditor*—Alexander T. Niven, C.A.
Council—Dr. J. Thomson, A. Craig-Christie, F.L.S., J. Small, W. Douglas, F. Brigleman, G. G. Mitchell, T. Pringle, J. Bertram, J. Crighton, W. Hume, A. Nicol, and W. Ranken.

The Ordinary Meetings are held at 5, St. Andrew's Square, at 8 o'clock, on the evening of the first Wednesday in each month, except August, September, and October. Annual Meeting on the first Wednesday of November.

PHOTOGRAPHERS' BENEVOLENT ASSOCIATION.
OFFICES: 181, Aldersgate Street, E.C.

Vice-Presidents—Rev. F. F. Statham, M.A., F.G.S.; J. H. Dallmeyer, F.R.A.S.
Trustees—Col. Stuart Wortley and Capt. Abney, R.E. F.R.S., F.C.S.
Treasurer—H. Baden Pritchard, F.C.S. *Auditors*—G. Taylor and L. Sisman.
Board of Management—W. S. Bird (Chairman), W. M. Ashman (Deputy), H. J. Burton, T. Bolas, J. A. B. Hall, E. Lavender, H. J. Thorne, J. O'Connor, A. Stevens, and R. E. Wilkinson.
Secretary—Henry Harland, 181, Aldersgate Street, and 83, Hawkesley Road, Stoke Newington, London, N.

Established to relieve members, their wives, and children, when in distress through sickness, death, or lack of employment, by means of immediate grants of money; to grant annual pensions to aged members, and to aid the unemployed members in getting situations by means of the *Employment Register*. Meetings on the first Wednesday in every month at 8 p.m. Book of rules, post free, 6d.

BRISTOL AND WEST OF ENGLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.

President—Colonel Biggs.
Vice-Presidents—Rev. W. J, Whiting, M.A., and T. Davey.
Treasurer—E. Brightman.
Hon. Secretary—H A. H. Daniel, "Avonmead," Leigh Road, Clifton, Bristol.

Meetings at the Bristol Museum, Queen's Road, at 7.30 p.m., on the first Wednesday in each month. Annual Meeting, October.

MANCHESTER PHOTOGRAPHIC SOCIETY.
ESTABLISHED 1855.

President—E. Leader Williams, M.I.C.E.
Vice-Presidents—Rev. Canon Beechey, M.A.; A. Brothers, F.R.A.S.; J. Chadwick; A. Coventry; and J. W. Leigh.
Hon. Treasurer—W. G. Coote.
Hon. Sec.—W. J. Chadwick, Prince's Bridge Iron Works.
Council—R. Atherton, W. Blakeley, T. Chilton, J. T. Chapman, S. D. McKellen, J. Pollitt, J. Schofield, J. Warburton, N. Wright, and James Young.

The Ordinary Meetings are held at the Manchester Mechanics' Institution, at 7 p.m., on the second Thursday in each month, from September to May inclusive. Annual Meeting in October.

AMATEUR PHOTOGRAPHIC ASSOCIATION.

President—H.R.H. the Prince of Wales.
Vice-Presidents—Archbishop of York; Marquis of Drogheda; Earl of Caithness, F.R.S.; Earl of Rosse, F.R.S.; Lord de Ros.
Council—Sir Antonio Brady; Arthur Farre, M.D., F.R.S., &c.; James Glaisher, F.R.S., F.R.A.S., &c.; J. D. Llewelyn, F.R.S.; G. Shadbolt; W. D. Howard; and Capt. J. C. A. Lewis, M.A., Cantab.
Referees—James Glaisher, F.R.S., F.R.A.S., &c.; and W. D. Howard.
Hon. Sec.—A. J. Melhuish, F.R.A.S., F.M.S., 12, York Place, Portman Sq., W.

This Association has for its object the Printing and Interchange of the productions of Amateur Photographers, in order that the many interesting and valuable negatives still buried in the plate-boxes of Amateurs may be brought before the notice, and placed within the reach, of the general public.

LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.

ESTABLISHED 1863.

President—E. Roberts. *Vice-Presidents*—B. Boothroyd and J. W. H. Watling.
Council—J. H. T. Ellerbeck, T. W. Bruce, A. Tyrer, W. E. Potter, B. J. Sayce, H. A. Wharmby, J. H. Day, G. A. Kenyon, M.D., E. Phipps, W. Wilson, W. H. Kirkby, and K. Bean. *Treasurer*—E. Twigge.
Hon. Secretary—Rev. H. J. Palmer, M.A., Clare Mount, Wallasey, Birkenhead.

The Ordinary Meetings are held at the Free Public Library and Museum, William Brown Street, at 6 p.m., on the last Thursday in each month, with the exception of December. Annual Meeting last Thursday in November.

BOLTON PHOTOGRAPHIC SOCIETY.

President—John Hick, Esq. *Vice-Presidents*—R. Harwood and T. Parkinson.
Secretary—Chas. K. Dalton, 48, Bridge Street. *Treasurer*—W. Banks.
Council—Messrs. Rideout, Haslam, Hawksworth, Tong, Knowles, and Taylor.

The Ordinary Meetings are held at "The Baths," at 8 p.m., on the first Thursday of each month. Annual Meeting first Thursday in November.

PHOTOGRAPHIC SOCIETY OF IRELAND.

ESTABLISHED 1879.

President—Dr. J. Emerson Reynolds, F.R.S.
Vice-President—Howard Grubb, F.R.A.S. *Treasurer*—Thomas A. Bewley.
Council—Professor Barrett, F.R.S.E.; Dr. Charles R. C. Tichborne; J. E. Madden; Thomas Mayne, T.C.; W. E. Wilson; John V. Robinson; Samuel Hunter; Joseph H. Woodworth, and Arthur Mayne, R.H.A.
Hon. Secretary—Alexander Conan, Roseneath, Sandymount Avenue, Dublin.

Meetings for the discussion of subjects connected with the art are held at the Royal College of Science, Dublin, at 8 p.m., second Friday during months of January, February, March, April, May, October, November, December.

DUNDEE AND EAST OF SCOTLAND PHOTOGRAPHIC ASSOCIATION.

President—J. C. Cox, Beechwood, Lochee.
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Hon. Secretary—Charles Johnson, 43, Nethergate.

Meetings at the Lamb Hotel, Dundee, the first Thursday in the month.

CHELTENHAM AMATEUR PHOTOGRAPHIC SOCIETY.

ESTABLISHED 1865.

President—C. E. F. Nash. *Treasurer*—John Bull.
Committee—G. S. Penny, B. Jones, and the Officers.
Hon. Secretary—W. C. Beetham, 7, Promenade Villas.

The Ordinary Meetings are held at the Savings Bank monthly, from November to May. Annual Meeting on the second Wednesday in January.

Excursions during the summer months.

WEST RIDING OF YORKSHIRE PHOTOGRAPHIC SOCIETY.

ESTABLISHED 1874.

President—E. Passingham. *Vice-President*—J. Howarth.
Council—E. Wormald, J. S. Shaw, T. Ledgard, R. Broadhead, T. C. Bridges J. Smith, E. Greaves, J. Garatt, E. T. Jenkins.
Treasurer—T. Illingworth. *Auditor*—W. G. Thompson.
Secretaries—J. Crosthwaite, 46, Great George Street, Leeds.

Ordinary Meetings at Market Tavern, Godwin Street, Bradford, first Monday in each month, excepting June, July, August, and September. Annual Meeting in November.

PHOTOGRAPHIC CLUB.

Trustees—A. L. Henderson and Frederick York.
Committee—W. Bedford, T. Bolas, W. B. Bolton, W. Cobb, A. Cowan, Payne Jennings, P. Mawdsley, and G. F. Williams.
Treasurer—E. Dunmore. *Librarian*—T. J. Pearsall.
Hon. Secretary—C. G. Cutchey, 62, Gracechurch Street, E.C.
Assistant Hon. Secretary—C. B. Cutchey.

Meetings at Ashley's Hotel, Covent Garden, Wednesdays at 7 p.m. One hour (8 to 9) each evening is devoted to the discussion of technical business, and the remainder of the evening to social purposes.

SHEFFIELD PHOTOGRAPHIC SOCIETY.

President—T. H. Morton, M.D.
Vice-Presidents—W. Dakin and J. D. Leader. *Treasurer*—J. Stringfellow.
Hon. Secretary—J. Taylor, Holland Place, London Road.
Council—G. V. Yates, J. H. Rawson, and Officers.

Annual Meeting in October. Meetings held in the Freemasons' Hall, Surrey Street, the first Tuesday in the month, at 7.30.

OLDHAM PHOTOGRAPHIC SOCIETY.

ESTABLISHED MAY, 1867.

President—George Hall. *Vice-President*—John Risley
Hon. Secretary—Alfred Knott, Yorkshire Street, Oldham.
Treasurer—Jeremiah Green.
Council—James Hall, Joseph Mallalieu, James Gartside, Sen., Robert Dalton, Thomas Kershaw, Enoch Horsfall, and J. Fullalove.

Meetings at the "Hare and Hounds" Inn, Yorkshire Street, the last Thursday in each month at 8 p.m. Annual Meeting in November.

Scientific Societies and Institutions.

ARTISTS' GENERAL BENEVOLENT INSTITUTION AND ORPHAN FUND.

24, Old Bond Street.

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22, Albemarle Street.

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Foreign Photographic Societies.

FRANCE.

Société Française de Photographie, Paris. *President*—M. Péligot.
Société Photographique, Marseilles. *President*—M. Ch. Teissèire.
Société Photographique de Toulouse. *President*—M. A. Pélegry.
Société Française des Archives Photographiques, Historiques, et Monumentales, Paris. *Director*—M. Versnaeyen.
Union Photographique de France. *President*—M. Collard.

BELGIUM.

Association Belge de Photographie, Brussels. *President*—M. Montefiore-Lévy.
Mutuelle Photographique Belge, Brussels. *President*—M. Delabarre.

HOLLAND.

Amsterdamsche Photographen, Vereinigung. *Pres.*—M. Haakman.

SWITZERLAND.

Geneva Photographic Society. *President*—Dr. H. Fol.

AUSTRIA (VIENNA).

Photographische Gesellschaft, in Wien. *President*—Dr. E. Hornig.

GERMANY.

Verein zur Förderung der Photographie in Berlin. *President*—Dr. H. Vogel.
Photographischer Verein zu Berlin. *President*—Dr. F. Stolze.
Photographische Gesellschaft zu Hamburg, Altona. *Pres.*—G. Wolf.
Verein zur Pflege der Photographie und verwandter Künste in Frankfurt. *President*—Dr. C. Schleussner.
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Verein der Photographen-Gehilfen zu Berlin. *President*—P. Meyer.
Deutscher Photographen-Verein, Weimar. *President*—K. Schwier.
Breslauer Photographen-Verein. *President*—M. Liebmann.
Kasseler Photographen-Verein. *President*—Prof. Roux.
Photographen Verein zu Nürnberg. *President*—J. C. Schmidt, Jun.
Münchener Photographische Gesellschaft. *President*—F. Müller.
Schleswig-Holsteinischer Photographen-Verein, Flensburg. *President*—J. Koch.

RUSSIA.

Russian Photo. Soc., St. Petersburg. *President*—Lt.-Gen. D. Birkin

AMERICA.

Photographers' Association of America. *President*—Mr. J. F. Ryder.
Photographic Section of American Inst., N. Y. *Pres.*—H. J. Newton.
Boston Photographic Association. *President*—Mr. G. H. Loomis.
German Photographic Society, New York. *President*—Mr. N. H. Krueger.
Brooklyn Photographic Art Association, New York. *President*—Mr. G. F. Van Doren.
Maryland Photographic Association, Baltimore. *Pres.*—Mr. E. Busey.
Photographic Society of Philadelphia. *President*—Mr. J. W. Bates.
Photographic Association of the District of Columbia, Washington. *President*—Mr. E. J. Pullmann.
Pensylvania Photographic Association, Philadelphia. *President*—Mr. H. S. Keller.
Chicago Photographic Association. *President*—Mr. Joshua Smith.
Indianopolis Photographic Association. *President*—Mr. D. O. Adams.
Chicago Photographic Institute. *President*—Mr. A. Hesler.
Photographic Association of Western Illinois, Galesburg. *President*—Mr. S. T. Bryan.

Buffalo Photographic Association. *President*—Mr. J. Samo.
Photographic Art Society of the Pacific, San Francisco. *President*—Mr. Jacob Shew.
Photographic Society of Boston. *President*—Mr. Parkinson.

INDIA.

Bengal Photographic Society, Calcutta. *President*—Mr. J. R. Phear.

Foreign Photographic Journals.

French.

Bulletin de la Société Française de Photographie, published in Paris. Monthly.
Le Moniteur de la Photographie, published in Paris. Bi-monthly.
Revue Photographique, published in Paris. Monthly.
Journal de Photographie, published in Paris. Bi-monthly.

German.

Photographisches Archiv, published in Berlin. Twenty numbers issued annually.
Photographische Mittheilungen, published in Berlin. Monthly.
Photographisches Wochenblatt, published in Berlin. Weekly.
Photographische Monats-blätter, published in Frankfort. Monthly.
Deutsche Photographen-Zeitung, published in Weimar. Weekly.
Zeitschrift für Praktische Photographie und Verwandte Fächer, pub. in Munich.

American.

The Philadelphia Photographer, published in Philadelphia. Monthly.
Anthony's Photographic Bulletin, published in New York. Monthly.
The St. Louis Practical Photographer, published in St. Louis. Monthly.
Western Photographic News, published in Chicago.
Photographic Times, published in New York. Monthly.

Dutch.

Tidschrift voor Photographie, published in Amsterdam. Monthly.
De Navorscher op het Gebied der Photographie, published in Amsterdam. Monthly.

Belgian.

Bulletin belge de la Photographie, published in Brussels. Monthly.
Bulletin de l'Association Belge de Photographie, published in Brussels. Monthly.

Austrian.

Photographische Correspondenz, published in Vienna. Monthly.
Photographische Notizen, published in Vienna. Monthly.

Danish.

Fotografiske Meddelser, published in Copenhagen. Monthly.

Italian.

Rivista Fotografica Universale, published in Brindisi. Monthly.

Indian.

Journal of the Bengal Photographic Society, published in Calcutta.
Indian Journal of Photography, published in Allahabad.

Russian.

Photographer, published in St. Petersburgh. Monthly.

Foreign Year-books.

Photographisches Jahrbuch. Vienna.
Annuaire Photographique. Paris.
Agenda de l'Association belge. Brussels.
Aide Mémoire de Photographie. Paris.
Agenda Photographique. Paris.
Photographic Mosaics. Philadelphia.
Deutscher Photographen Kalender. Weimar.

Annals of Photography for 1881.

PROBABLY the most striking novelty brought forward during the year that has gone in the field of photographic research, is the discovery of Mr. Leon Warnerke, that the image upon a gelatino-bromide film produced by exposure to light and development with pyrogallic acid may be laid bare by washing in warm water. The gelatine that does not compose the image is capable of being washed away, and there remains upon the glass nothing but a film of insoluble gelatine and reduced silver, which together form the picture. In a word, Mr. Warnerke showed that the sensitive gelatino-bromide film after the double action of light and pyrogallic development could be treated precisely as bichromated gelatine when impressed by a light image, and that the bromide film may be regarded, in fact, as very sensitive carbon tissue. That, so far, no extensive application of Mr. Warnerke's beautiful process has been made, does not detract from its high scientific value, for some time must necessarily elapse before a discovery of this nature can be thoroughly realised by practical men in all its details.

Scarcely less important than Mr. Warnerke's successful research are the investigations made by Dr. J. M. Eder and Captain Pizzighelli on the subject of gelatino-chloride printing. There is little doubt that gelatino-chloride will shortly become familiar to the general photographer, for the above investigations have already proved practically its value. Their results are not those of a laboratory experiment. At the International Exhibition of Photography, held during the year at Vienna, a large series of very fine transparencies were shown, full of harmony and detail, and possessing a range of tone that is almost unknown in photography. These exquisite transparencies remove the process at once out of the domain of experiment into the every-day world; and henceforth it will be the fault of photographers themselves if they do not avail themselves of one of the most charming processes of recent times. While on this subject, we should refer to the experiments that have also been made with gelatino-chloride by Captain Abney and Mr. Herbert B. Berkeley.

The efforts made to produce a gelatine emulsion which could be sold in commerce after the manner of collodion, so that photographers might coat their own plates, have not been crowned with complete success. Dr. Hermann Vogel, of Berlin, has produced, and still continues to produce, large quantities of alcoholic gelatine emulsion, which

find favour both in Germany and in this country; but that chemist is still occupied in research with a view to a complete solution of the problem. Another foreign experimentalist, M. Konazewski, has also succeeded in combining the two vehicles, collodion and gelatine, in the working of a sensitive emulsion.

Gelatino-bromide emulsion itself has attracted further attention. Dr. Kenyon's plan of producing emulsion in daylight may be cited as a useful contribution to the subject, and so, too, may Dr. Lohse's plan of avoiding the tedious operation of washing. Captain Abney's useful manual on emulsion-making has been succeeded by a volume by Dr. Eder on "Modern Dry Plates," in which the subject not only of preparing gelatino-bromide is fully discussed, but the alternatives of boiling and adding ammonia treated with much circumstance; while the whole subject of gelatine is chemically explained in a manner at once both masterly and scientific. Gelatino-bromide paper has become a marketable article, thanks more particularly to Mr. W. T. Morgan, who has led the van in producing an excellent material, suitable not only for enlargements, but all sorts of rapid printing.

In the matter of developers we have not progressed very far. The suggestion of Captain Abney to employ hydrokinone is likely to prove of value, and the new mercury intensifier prepared by Messrs. Cosmo I. Burton and A. P. Lawrie also bids fair to take a permanent place among standard formulæ.

Captain Pizzighelli has been devoting some attention to black-and-white printing, and the result of his labours are two modified processes termed nigro-photography.

Collotype printing goes on apace, especially in Germany; it bids fair to hustle aside every other process of mechanical photo-printing by reason of its cheapness and improvement. Machine printing by the so-called *Schnell-press* is an accomplished fact, an etching of the plate—a recent innovation—being all that is necessary to fit the gelatine image for more rapid work. Twelve-inch collotype prints—copies of engravings—are printed for halfpenny a-piece; but pictures from nature, and portraits especially, are still somewhat costly to produce.

Mr. Woodbury, in the Stannotype process, considerably simplified the process that bears his name, and he is now enabled to produce impressions without the use of the hydraulic press. Other photo-engraving processes are making way. Of two French processes, that of M. Dujardin and the *photo-gravure* method of M. Rousselon, readers of the Photographic News have been able to judge by specimens given in that journal; and of a third process, that of Herr Klic, of Vienna, the frontispiece of the present volume affords an example.

We ought to say a word regarding our portrait of Mungo-Ponton an Englishman who may well be termed the discoverer of permanent photographic printing, for he it was who proposed, in 1839, the em-

ployment of bichromate in photography. Klic's is an etching process upon copper, an imprint from a carbon diapositive being secured upon that metal. The mode of preparing the copper is a secret, but we may mention that the process is so quick, that within four or five days an engraved plate may be produced of considerable dimensions. Of the quality of the printing our readers can judge for themselves. Suffice it to say, the process is an inexpensive one, and that during the past year alone, no less than three hundred photo-engravings were produced.

Scientific applications of photography are more rife than ever. Some important magnetical discoveries have resulted from the photographic records kept in our Observatories, and now that cloud photographs—clouds are important foretellers of wind and weather—are also to be taken at Kew and elsewhere, we may hope that photography will do still more in its sphere of a patient and impartial recorder. Mr. G. M. Whipple, the director of Kew Observatory, sketches a cloud camera in this volume.

Dr. Huggins and Professor Draper have employed photography with effect in their observations of the comet that was so plainly visible during the present year, and the former has now established a methodical system of photo-spectroscopic observation of the stars that is the admiration of astronomers and photographers alike.

Thanks to the efforts of Mr. Swan and Mr. Jarman, there seems a possibility of the electric light being brought within the reach of photographers generally, for although electric photography is no longer a novelty, there are few at present who can afford the luxury of electric illumination in their studios.

"Instantaneous shutters" still multiply. At present their name is legion, and every day sees an accession to the ranks. In spite of all, however, a useful and trustworthy rapid shutter has still to be invented. Among novel apparatus we may mention Mr. W. Bedford's quick acting shutter, and Mr. Bolas' so-called "Detective Camera," which bids fair to find useful application.

In conclusion, we must say a word of those who have made their mark in photography, and will never do so again. Two names stand out prominently in the obituary of the present year. M. Adam-Salomon, a great artist and a great photographer, sleeps the sleep of the righteous. Photography is gradually but surely gaining a footing in the temple of art, and one of the first to gain an entrance, and place his foot therein, was the clever sculptor whose photographic work took the world by storm at the time of the Paris Exhibition of 1867. Mr. J. R. Johnson will be best remembered for his simplification of the carbon process. His happy idea of getting the carbon film to adhere by atmospheric pressure to an impermeable surface during development had much to do with the vulgarization of pigment printing.

Guides to Practice.—By Various Contributors.

PHOTOGRAPHIC RESEARCHES BEFORE DAGUERRE.

BY ROBERT HUNT, F.R.S.,

Author of "Researches on Light," "Photography," &c.

BOYLE, about the beginning of the eighteenth century, published a treatise entitled, "Of Man's Great Ignorance of the Use of Natural Things." In the first section he wrote, "There are very few of the works of Nature that have been sufficiently considered, and are thoroughly known." Notwithstanding the advances made in the last century and a-half in all divisions of scientific knowledge, the words of the philosopher are as applicable now as they were when Boyle wrote them. We too frequently allow ourselves to believe that we have, by our intellectual powers, achieved the conquest of all truth; whereas, a careful examination of our stores of knowledge will carry conviction to the thoughtful mind that an untravelled ocean is still before us, studded with islands, redolent of lights, which are yet undreamed-of in our philosophy.

There are not many divisions of scientific enquiry which exhibit this more strongly than those investigations which belong to actino-chemistry, and the remarkable phenomena of photography. It appears, therefore, that a few pages devoted to an examination of the progress of discovery, in the period preceding the announcement of Daguerre's beautiful art, will not be without advantage. It is curious for how long a period man is found wandering, erratically, within sight of a truth before it makes any permanent impression on the mental retina.

From the early periods of time, we find records by the ancient philosophers, of peculiar influences exerted by the solar rays. In the days of the Alchemists it was noticed that the sun's rays weakened or destroyed colours. Their favourite hypothesis was, that gold differed from the baser metals only in being more "thoroughly penetrated or pierced through with the sulphur of the sun's rays." Minute atoms, by their smallness and their swift motions, were supposed to be capable of permeating the hardest bodies. Homberg, a man far in advance of his alchemical brethren, promulgated the doctrine that the sun's rays have the power of insinuating themselves into bodies, and to greatly increase their weight. "A perfect metal is but pure mercury, whose small particles are every way pierced and filled with the sulphurous principle of the matter of light," was one bright guess. Another was, "The light of the sun impinging against terrestrial bodies, modifies them according to their several textures." These thoughts are not very far different from the views entertained by Sir Isaac Newton, who asks whether "gross bodies and light are not convertible into one another, and may not bodies receive much of their activity from the particles of light which enter into their composition?"

We find in Boyle's "Memoir for a General History of the Air" some remarkable passages, which clearly show the powers of a deeply penetrating mind, looking into mysteries which are to be developed in future ages. For example, he says, "All light is attended with some peculiar power, virtue, or tincture; whence it is plain that every light has its peculiar property, tincture, and colour." Light was regarded by Newton as the most important and active power in the scheme of creation; and he evidently had a perception, dim though it may have been, of the different powers of the rays of light, when he resolved the colourless band into the beautiful prismatic rays.

After this we find a constantly increasing and more exact attention to the influences exerted by light upon matter. In 1722, Petit, in his "Sur la Vegetation des Sels," showed that certain salts crystallized more readily in the light than they did in darkness. Following this chemist, Chaptal and Dizé confirmed his statements, and especially drew attention to the influences of light on organic changes. A powerful principle was perceived as ever active in nature; and Scheele, in 1775, attempted to prove that "the inflammable principle '*phlogiston*' existed in light." In pursuing this phantom, this Swedish chemist almost became the discoverer of photography. "A solution of silver in acid of nitre poured on a piece of chalk, and exposed to the rays of the sun, becomes black. The light reflected from a white wall has the same effect, though more slowly." Subsequently, Scheele advanced to the important discovery that the prismatic rays possessed powers remarkably different from each other. He informs his reader that if he allows the solar spectrum to fall on "a paper strewed with *luna cornua*, he will observe that this horn silver grows sooner black in the violet ray than in any of the other rays." Senebier repeated the experiments of Scheele, and found that the violet ray darkened the chloride of silver in fifteen minutes, while the red ray required twenty minutes to effect the change. Senebier also examined the bleaching of wax by exposure to the sun's rays. About 1795 it became a question whether the chemical changes which had been observed were produced by the light, or by the heat which accompanied it. In 1798, Count Rumford communicated to the Royal Society a memoir entitled, "An Inquiry concerning the Chemical Properties which have been attributed to Light." In this paper a large number of experiments are described, especially such as show the facility with which gold is revived from its compounds by the combined influences of light and heat. The results at which Count Rumford arrived were "that heat is generated by the absorption of the sun's rays; that at the moment of its generation it exists in almost infinitely small spaces, and consequently it is only in bodies that are inconceivably small that it can produce durable effects." The real meaning of this is not very clear; but it appears to signify, that the decomposition of the salts of gold and silver were due to the action of radiant heat.

In Nicholson's Journal for August, 1804, Mr. Robert Harrup published a paper showing that several of the salts of mercury

were reduced by the luminous rays of the sun, and not by their heat.

About the end of the eighteenth century attention was directed to the influence of light on plants. The experiments made by Priestley, which were conducted with great care, and published in his work, "Experiments and Observations on Different Kinds of Air," &c., about 1790, showed, in a striking manner, the chemical power exerted by the solar radiations on vegetable life, and on inorganic combinations. The deductions drawn from these investigations were so influenced by the lingering hypothesis of "Phlogiston," that they failed to carry any conviction to the thinking mind, and they consequently were eventually neglected.

Ritter, in 1801, resumed the enquiry into the chemical action of the sun's rays, and arrived at the conclusion that some solar radiations, which do not sensibly affect the eye, possessed powerful properties in producing chemical change. This chemist especially noticed that chloride of silver was rapidly darkened by the most refrangible rays *beyond* the visible violet rays, and that the least refrangible red rays had the power of restoring the darkened chloride of silver to its original state. There were several other peculiarities observed by Ritter in the different rays of the spectrum, which are instructive, and which still wait for further investigation.

Dr. Wollaston, in 1802, in a memoir published in the Philosophical Transactions, after mentioning several interesting results in connection with the chemical influences of the solar spectrum, says: "This and other effects, usually attributed to light, are not, in fact, owing to any of the rays *usually perceived.*" Dr. Wollaston also showed that gum guaiacum acquired a green colour in the violet rays, which colour was rapidly destroyed by the red rays.

In 1800, William Herschel published his memoir on the heating powers of the solar spectrum, and he is led to enquire, "May not the chemical properties of the prismatic colour be as different as those which relate to heat and light?"

Dr. Young confirmed the results obtained by Ritter and Wollaston, and in 1806 Vogel described several curious changes produced in phosphorus, in ammonia, and in corrosive sublimate. Thus, a series of remarkable enquiries were in progress—all of them advancing towards the discovery of the photographic art, but none of the thoughtful minds which were engaged in the investigation appear to have been directed towards the utilization of the phenomena they were observing in the direction of causing the sun's rays to make permanent impressions of external nature. The first indication of this is given in 1802, when Thomas Wedgwood, the son of the celebrated porcelain manufacturer, published, in the Journal of the Royal Institution, "An Account of a Method of Copying Paintings upon Glass, and of Making Profiles by the Agency of Light upon Nitrate of Silver, with Observations by Humphry Davy."

Wedgwood's process, as is well known, consisted of "white paper

or white leather moistened with a solution of nitrate of silver." No method of fixing the photographic image was known to Wedgwood. He says: "After the colour has been once fixed on the leather or paper, it cannot be removed by the application of water, or water and soap, and it is in a high degree permanent." This permanence was, however, of a very limited description. The discoverer himself says: "Even after repeated washings, sufficient of the active part of the saline matter will still adhere to the white parts of the leather or paper to cause them to become dark when exposed to the rays of the sun."

Wedgwood was never enabled to obtain any good results with the camera-obscura. The images formed were found to be too faint to produce in any moderate time an effect upon the nitrate of silver. Sir Humphry Davy found that images of small objects, produced by means of the solar microscope, may be copied without difficulty on prepared paper. The want of any satisfactory result in the hands of two such men as Thomas Wedgwood and Humphry Davy appears to have discouraged any further experiments at this time in England.

Considerable excitement was produced about eighteen years since by a statement, rather hastily made, that photographic drawings had been discovered of a much earlier date than those produced by Thomas Wedgwood.

In the Journal of the Photographic Society (No. 139), November 16th, 1863, will be found a report of a meeting held on the 3rd of that month, when the president—the Lord Chief Baron—asked the members "to examine a most interesting subject, and to listen to the history of those photographs of an early period which Mr. Smith has rescued from oblivion."

Pictures on paper, and on silver plates, which were found in the library of Matthew Boulton, of Soho, Staffordshire. "His," Mr. Smith's own opinion, "was that the paper pictures were the production of the camera-obscura, that the images were thrown on the paper prepared with some chemical substance." "The paper pictures he found were produced by a method invented by Mr. Francis Eginton, about the year 1700." This, of course, gave rise to considerable discussion, with which it will not be necessary to detain the reader, since the Journal quoted, and others which immediately follow it, contain the whole story. These were followed by a pamphlet, "Remarks on some Evidence Recently Communicated to the Photographic Society," by Mr. M. P. W. Boulton. Several editions of this pamphlet were published, each one containing additional evidence, proving that the pictures in question were not photographs at all, but that they were produced, under the direction of Mr. Eginton, by a mechanical process, and that they were made articles of trade.

After the most careful and prolonged examination, Mr. Boulton concludes, "My father never intimated any opinion that these pictures were photographs, *or similar to photographs.* I feel convinced that neither my father nor the late Mr. Watt entertained any belief or suspicion that photography had been practised at any early period at Soho."

It unfortunately happened that the author of the life and work of Josiah Wedgwood committed herself to a statement, which was received on her authority as reliable, and which went to support the view that photography was advanced to a much higher state of excellence than was generally supposed.

Miss Meteyard, in a letter dated November 2nd, 1863, says: "You may safely refer the first experiments in photography to as early a date as 1790 or 1791." This lady then wrote, "The first process seems to have consisted in laying nitrate of silver upon paper, and then, by means of the camera-obscura, and the solar rays acting on the paper, a perfect *impression was obtained of any object in half a second;* but the image soon faded on exposure to light, and after a while disappeared." Miss Meteyard was evidently most imperfectly informed; the fact being that Thomas Wedgwood himself states, as has been already shown, that very faint impressions only could be obtained by prolonged exposure in the camera-obscura. Two plates, thought to be Daguerreotype, were exhibited as the work of some early photographer, but Mr. Boulton sets this at rest by stating, "The two photographs on the metal plates, exhibited as ancient photographs made in the last century, are unquestionably modern photographs made about 1840."

Much was made of the discovery of a camera in Soho House. Miss Meteyard, in her life of Josiah Wedgwood, herself settles this question. Mr. Wedgwood, writing to Mr. Bentley, on the 14th of August, 1773, says: "I wish you could send me a good camera-obscura, not too cumbersome, that I could take to the gentlemen's seats here." His object being to ornament a service of china which he was preparing for the Empress of Russia, with views of "the stately homes of England," by the drawings sketched more readily by the use of this instrument.

About 1802 or 1803, M. Charles, a lecturer on Modern Photography, in Paris, proposed to make use of a prepared paper to produce profiles by the action of light. M. Moigno stated that no authentic document attesting this discovery could be found. It has, however, been stated, with considerable probability, that M. Charles threw the shadow of the individual whom he desired to copy upon paper prepared with the chloride of silver. By keeping this shadow stationary for a few minutes, he obtained a white image with a black ground—*a negative profile*—from which, with even imperfect fixing, he could obtain *a positive profile.*

For many years nothing appears to have been done in photography. We find Desmortiers, Sage, Young, Vogel, Wm. Herschel, Seebeck, and others pushing their enquiries into the phenomena of chemical change under the influence of the sun's rays; but it was not until 1814 that any attempt was made to copy objects from nature by this agency.

In that year, M. Nicéphore Niépce, of Chalons-on-the-Saône, first turned his attention to the chemical agency of light, and he appears to have discovered that the solubility of resinous substances was altered by exposure to the sun's rays. We know but little of the progress made by Niépce until the 5th of December, 1829, when he informs M. Daguerre that his process, "to which I give the name of heliography,

consists in producing spontaneously by the action of light, with gradations of tints from black to white, the images received by the camera-obscura."

He also communicates some particulars of his process. He tells Daguerre that he half fills a wine-glass with powdered asphaltum or bitumen of Judea, or Jew's pitch, and pours, drop by drop, upon it the essential oil of lavender, till the bitumen can absorb no more. He then added as much more of the essential oil of lavender as will cause the whole to be covered with a layer of the oil, and exposed the mixture to a gentle heat, until the essential oil is fully impregnated with the colouring matter of the pitch. This varnish is to be allowed to evaporate slowly, without heat, carefully protected from the moisture or light. This varnish is carefully applied to a tablet of plated silver, and placed upon heated iron, until the resinous mixture ceases to simmer. The plate is immediately placed in the camera, and submitted to the action of the chemical radiations. When the change has been completed, which occupies a long period, even from seven to eight hours, no trace of any image can be discovered on the plate. It is next placed in a solvent consisting of one volume of essential oil of lavender and ten volumes of "oil of white petroleum." The picture under this treatment gradually reveals itself. As soon as the best effect is produced, the plate is lifted out of the fluid with great care, and placed in a vertical position, till much of the solvent drains away; it is then carefully washed in a stream of flowing water.

Such is essentially the process of Niépce. It was evidently tedious and uncertain. Under the influence of bright sunshine, from two to three hours were required to produce a copy, even of an engraving. Niépce made many experiments with a view to improve the process, especially he desired to blacken the uncovered silver, and so give intensity to the picture. This, he thought, he had achieved by the use of iodine vapours; when an iodide of silver was formed, and this blackens upon exposure.

In 1827, Nicéphore Niépce was in England, and in December of that year he communicated a description of his heliographs to the Royal Society of London through Mr. Bauer and Dr. Wollaston; but as M. Niépce refused to give the details of his process, his communication was not printed.

Specimens of heliography were given by M. Niépce to Francis Bauer, of Kew, and at his death these plates were given to the late H. Robert Brown, of the British Museum, and they are still in the possession of his representatives. These pictures are—

1. The ruins of an abbey.
2. A courtyard seen from an upper window.
3. Copy of a print.
4. Copy of a head etched by an after process.
5. A landscape and ruins.

Of this last one, a fine specimen was given to Mr. Cassells, of Rich-

mond, and it is understood that some plates were also given to Sir Edward Home. Nine letters, written by M. Niépce in 1827-8-9 to Francis Bauer, Esq., are preserved and published in the "Researches on Light." These show, with some unfortunate reticence, the progress made in heliography at this time.

It is stated that in 1824 Daguerre commenced a series of experiments. There is no record of a reliable character of Daguerre's early experiments. He was a painter of beautiful dioramic pictures; and it has been stated, with probably some degree of truth, that he desired to employ white cloth saturated with nitrate of silver to produce a general clouding over a picture, previously seen in full sun-light, and that during those experiments he was struck with the sharpness with which the shadows of any intervening object were delineated on the cloth. Certain it is that Arago stated that the first substances used by Daguerre were the nitrate and chloride of silver, and that his ill-success induced him to abandon them. He then evidently worked with diligence with iodide of silver, and he also persuaded Niépce to experiment with that compound. In 1831-2, Niépce regrets that M. Daguerre has induced him to make experiments with iodine, since he has lost much time, and he does "not see that we can hope to derive any advantage from this process more than from any other method which depends upon the use of metallic oxides." Again, he says he has tried the results of using decoctions of *Thlapsi Bursa pastoris*, the fumes of phosphorus, and vapours of sulphur, acting on silver as iodine does, and caloric "producing the same effect by oxidising the metal."

We can trace, in all these experiments, the progress of the enquiry which gradually led up to the use of iodine vapour to attack the silver plate in the first instance, and produce a highly sensitive surface. Of the subsequent discovery by Daguerre of the development of the picture by the use of the vapour of mercury, we have no other hint than that given by the fact of his using the vapours of phosphorus and sulphur to produce sensitive surfaces.

In 1839 Daguerre astonished the scientific world of Paris by exhibiting specimens of pictures taken by the camera-obscura with the most perfect gradations of light and shadows, and details wonderful in their minuteness. In 1834 Mr. W. Fox Talbot commenced his experiments, but he did not publish his results until the announcement of Daguerre's discovery had surprised the world.

The rapid sketch, in which an endeavour has been made to trace the steps by which a point of abstract science has been rendered of great commercial value, should instruct us that no truth can be born until its appointed time, and that every truth is certain of having, sooner or later, a real value to mankind.

The thoughtful reader cannot but be convinced, from the facts stated, that there are numerous points connected with the chemical changes effected by the action of the solar rays which require most careful investigation. The beautiful results obtained by the practice of the photographer have drawn attention away from the study of the scientific

phenomena which underlie them. If these remarks should recall a few active minds to the careful study of actino-chemistry, the results would certainly afford a most ample reward to the investigator, and advance the cause of truth.

FOREGROUNDS.

BY H. P. ROBINSON.

PROVERBIAL philosophy is one of the inexact sciences, if philosophy can be called a science, and if a science could be inexact. One of the art proverbs tells us that if you look after the shadows, the lights will look after themselves. Perhaps they will, but they would certainly suffer from the inattention. There is a similar saying to the effect that a good foreground will excuse a bad distance, as if anything could excuse "bad" in art; but it is certainly true that if a picture has not a picturesque foreground, it lacks a great element of completeness. This is especially true in photography. A landscape photograph seems to demand a good foreground. Other parts of the picture must compose well and be in harmony, but it is not necessary that they shall be of importance; while if the foreground be weak or ill-composed, no strength or importance in other parts will save the picture in a pictorial sense.

Among the vast advantages the introduction of gelatine plates has conferred on photographers is the much greater facilities the quick process affords for the introduction of figures into landscapes. It is scarcely an exaggeration to say that everything is now possible in photography, as far as quickness of exposure is concerned. It was very pleasant to see in the Exhibition just closed, the great advance that has been made in the composition of landscape photographs, simply because the photographers were not deterred from introducing figures by fear of their moving. There was more action, a more natural effect, a greater feeling of spontaneity in the figures than has ever been shown before in photographs. Perhaps there were some a little too natural, if that be possible. There were too many pictures in that Exhibition in which the critic could not help recognising the effect of accident, rather than art. They looked as if the photographer had fired off any quantity of shots "into the brown of them," as a sportsman would say, right and left, back and front, regardless of aim, and then picked up the birds they had accidentally shot. This fault will cure itself in time, and experience will teach us how to select and admire the results of deliberate thought, in preference to the flukes of the photographic *mitrailleuse*.

It is not every subject that has a good foreground ready made, but it is often within the power of the photographer to do well with apparently very indifferent materials. A spot of white or black put in the right place may turn a poor subject into a perfect picture. What the spot shall consist of must be left to the ingenuity or readiness of the photographer. It may be a human figure, or a bird, or a beast, or a fish—in

one case I have actually seen it consist of a fish, for, as I have said, all things are possible now; but the requisite spot, whether white or black, or both, must be got. One of the best effects I know, is obtained by placing a small but picturesque figure, dressed in black-and-white, in the immediate foreground, and letting the landscape consist of variations of tone between the two extremes; but the black of the figure must be darker, and the white lighter, than any other part of the picture.

It would be useless to go into any detail as to the arrangement of foregrounds; the disposition of each can only be settled as each case arises; but it will be well to remember that the more simply and broadly they are treated, the better will be the result. Indeed, it cannot be too strongly impressed on the photographer, that the more simple his subject—if he aims at fine art—the better it is adapted to his means. The best painters are often content with the simplest subjects; the inexperienced are too apt to select the most ambitious themes. The young painter struggles with the highest flights of history (or he used to do so, he is wiser now); but the great artist often finds the highest art in the simplest subjects. It has been well said that "true genius is never better displayed than by certain great landscape painters in the happy simplicity of their noblest subjects."

DEVELOPMENT OF PORTRAIT NEGATIVES WITH FERROUS OXALATE.

BY DR J. M. EDER.

The ferrous oxalate developer, when properly used, is capable of yielding portraits of wonderful clearness, and full of the most delicate detail.

There are two modifications which for this class of work will be found of great utility: simple dilution of the developer; and, secondly, addition of hyposulphite of soda.

It is necessary under all circumstances to vary the constitution of the developer in accordance with the emulsion employed. In the case of one consisting of pure bromide of silver, prepared without ammonia, which has been boiled for half-an-hour, or treated for one hour at a temperature of 80° C., the following formula will be found of value—

Potassium oxalate solution (1 : 4 of water)	...	80 parts
Ferrous sulphate solution (1 : 4 of water)	...	20 "
Distilled water	...	20 "

To every four ounces, add five drops of a (1 : 10) solution of potassium bromide and thirty drops of a (1 : 200) solution of hyposulphite of soda. The picture makes its appearance rapidly, and the development should be continued until the deepest shadows begin to veil over. Plates treated in this way prove extremely delicate in detail, and the dark portions of the drapery are as clear as the deep shadows; the concentrated developer, on the other hand, gives too much vigour and contrast in the high lights.

The weaker the developer, the clearer is the resulting picture. If a negative developed by the above formula be too hard, a further addition of thirty drops of hyposulphite may be made. In the case of an emulsion which has been boiled for more than half-an-hour, or which has been prepared with ammonia, any tendency to fog during development can be obviated by increasing the amount of potassium bromide from ten drops to fifteen or thirty. Generally speaking, an emulsion prepared without ammonia requires more hyposulphite than one into which ammonia has been introduced. It is a good plan, in case there is a tendency to fog, to commence the development without the hyposulphite, and to add it when the high lights are gaining intensity. It is a remarkable fact that the diluted oxalate developer in connection with hyposulphite of soda admits of a much greater latitude of exposure. There is very little difference to be detected between a normally exposed plate, and one which has received two or even three times the exposure. It is only necessary to leave the plate a shorter or longer time in the solution. Captain Toth and I have been in the habit of omitting the potassium bromide, and adding in its stead a portion of an old oxalate developer. Angerer recommends diluting the developer, and adding in addition a proportion of an old developer.

For portraiture the following formula will be found useful:—

Potassium oxalate solution (1 : 4)	80 parts
Ferrous sulphate solution (1 : 4)	20 ,,
Old developer	20 to 30 ,,

To four ounces of this mixture add 15 to 30 drops of hyposulphite of soda (1 : 200).

An old developer to which hyposulphite has been added will not keep good for more than twenty-four or forty-eight hours. Under these circumstances it is better to make up the ordinary developer and allow it to stand for a few days, either in a corked bottle, or covered with a layer of paraffin oil, until it is required for use, when the necessary amount of a fresh solution of hyposulphite can be added.

NEW CLOUD CAMERA FOR METEOROLOGISTS.

BY G. M. WHIPPLE, B.SC., F.R.A.S.,

Superintendent of the Kew Observatory of the Royal Society.

THOUGHTFUL meteorologists have for some time been aware that the various problems presented to them for solution by our very fickle climate are not to be solved by instrumental means only, and that, however valuable the results may be which are given by barometers, thermometers, hygrometers, anemometers, electrometers, and rain-gauges, yet there remain important factors in the weather not reached by these appliances.

Perhaps one, if not the most noteworthy, of these factors is the state of the sky, and accordingly, we find that now, registration of the dura-

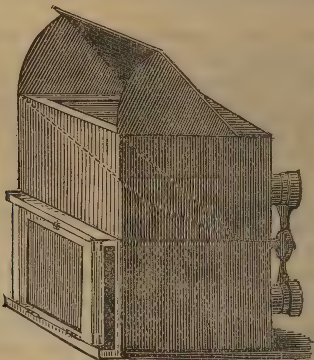
tion of sunshine is a necessity in every well-organized system of observation. More recently, however, the researches of Clement Ley and others have shown that valuable information as to the nature of storm progress is to be obtained from cloud-watching ; in fact, a partial relapse into the old-fashioned weather wisdom of sailors, fishermen, and shepherds is now taking place, and it has become desirable to collect as much evidence as possible of the various transformations to which the fleecy denizens of the sky are subject.

With a view of studying these changes at leisure, the aid of photography has been called in, and several "photo-nephoscopes," or cloud cameras, have been designed by Professor Stokes, Captain Abney, Mr. F. Galton, and others.

Having worked with some of these instruments, the author was led, in February 1880, to adopt an arrangement which, having been constructed for him by Messrs. R. and J. Beck, of Cornhill, London, he has since employed most successfully.

His camera, which is virtually a camera-obscura super-imposed upon a photographic camera, resembles somewhat an ordinary stereoscopic camera set up on end, but with this difference, that, whilst the lower half remains a common camera, and is provided with its own back, the upper half is distinct from it, and entirely closed, part of the top, however, being formed of ground-glass.

A reflector is placed obliquely in its interior (as shown by dotted lines in the cut), and this throws the image of any object to which



the lens is directed upon the ground-glass, and so permits of its being focussed.

A hinged lid, with side flaps, serves to exclude a sufficient amount of extraneous light to permit of the directing and focussing of the instrument, without the use of a focussing cloth, under ordinary circumstances. Both lenses are actuated by the same pinion, so that the image

on the sensitized plate will be in proper focus when the adjustment has been made for that on the ground glass. A suitable instantaneous shutter attached to the lower lens, and a tripod support permitting of the apparatus being rapidly directed to any part of the sky, completes the arrangement.

An observer provided with this camera and a stock of dry plates is able then, at a moment's notice, to turn his lens on any particular cloud-formation that he may think desirable to photograph, and, by watching on his focussing screen its movements and changes, can select the most favourable opportunity for exposing his plates, without running any risk of losing it during the interval occupied by the process of substituting the back for the focussing screen. Another advantage possessed by the new apparatus is the facility it affords for photographing clouds near the zenith. The focussing of these with an ordinary camera requires a previous training in gymnastics on the part of the operator.

The camera, as at present constructed, is only adapted for the use of quarter-plates.

It is the intention of the author to modify somewhat the cover of the ground glass, so as to permit of the camera being used for general purposes, and thus prevent the necessity for employing a focussing-cloth in out-door work. This improvement will render the instrument available for street photography like the so-called detective camera.

The camera and specimens of cloudscape produced by its aid were exhibited at the Royal Institution, London, and the Richmond Fine Art Exhibition last spring.

HOW I RETOUCH.

BY FRITZ LUCKARDT.

THE varnish I employ for retouching I make up for myself. It is a little different, I think, to that generally employed, and is compounded of the following ingredients, viz.—

Alcohol	300	parts
Sandarac	50	,,
Camphor	5	,,
Castor oil	10	,,
Venetian turpentine	5	,,

I retouch both with brush and pencil, for very much may be effected upon the negative by the artistic use of a camel-hair brush; in fact, I think its employment indispensable in combination with pencil work. I use pencils of two kinds, those of Faber, and of L. C. Hardtmuth, an

Austrian manufacturer, both of whose productions are exceedingly suitable for working on my varnish film.

Recently I have been taking portraits in my studio—bust and three-quarter—with perfectly white backgrounds. Then, round the head or figure, I scratch—or shade, you may call it—with a needle, so that a certain artistic effect is secured around the portrait; since this is on a plain white ground, this shading tells with much effect. The statement has often been made that I spend much time and labour in retouching. In reply, I may say that at the most I occupy a quarter-of-an-hour in retouching or shading a plate in this manner, and if a skilled and practised retoucher were to take the work in hand, he would probably do it in less time still.

PHOTOGRAPHING TORPEDO EXPLOSIONS.

BY LIEUT. RICHARD W. WHITE, R.N.

Having been requested to write a short article for the Year-Book of Photography on the frame of torpedo explosives exhibited by me at this year's Photographic Exhibition, I will begin by mentioning the apparatus that I used to obtain them. The lens was by Steinheil, to cover a plate from 8½ to 6½ to 10 by 8; the plates, principally Wratten and Wainwright's, but also some of Swan's, and B. J. Edwards'. To obtain the great rapidity in the means of exposing necessary for obtaining a clear photograph of a column of water in motion, I arranged an electrical shutter. In principle it was the same as the ordinary drop shutter, with adjustable apertures, except that the slide was made of brass to increase by its weight the rapidity of its fall, and consequently the shortness of exposure. Secured at the back of the frame-work which held the slide was an electro-magnet and armature; the latter so arranged that one end of it kept the slide up until it was attracted over, when the slide was released, and the plate exposed. This arrangement could be made, if necessary, to give an exposure of from one-fortieth to one-fiftieth of a second. To give the necessary current of electricity, a form of bichromate cell was used, but made shorter and of larger diameter than the usual pattern, for greater convenience of carrying about. This cell has two carbon and one zinc plate; the zinc plate being kept out of the liquid by means of a spring. On requiring to drop the shutter, this spring is pressed, which allows the zinc plate to come in contact with the liquid, and which, when again released, takes it back into its original position. This cell answered well when no very great length of wire was used.

The explosions exhibited were of two different descriptions of torpedoes—namely, stationary torpedoes, such as would be used in time of war to defend our harbours; and spar torpedoes, used from boats for attacking purposes, and exploded at a depth of ten feet below the surface of the water. The charges ranged from 40 to 180 lbs. of gunpowder,

and in both cases fired by electricity. In taking these photographs, I usually focussed, if possible, the boat when laying out the torpedo, or some marked position where the explosion would take place. After having fired the torpedo, I dropped the shutter when the column of water seemed to be at its highest.

The negatives were mostly under-exposed, but some were, even with this short exposure, of a very good printing quality, and all the details clear and well defined. Unless carefully adjusted, the shutter is sometimes shaken down by the concussion; and, when focussing a marked position over the torpedo in a tideway, due allowance has to be made to avoid the explosion being off the plate.

The rapid dry plate has been of the greatest use in taking this class of photograph where wind, tide, and weather have to be contended against. It gives a rough way of comparing the effects of various charges and different description of explosives by the heighth and breadth of the column of water thrown up. The difficulties of photography on board ship are also very much lessened, and a naval amateur is not such a disagreeable neighbour as in the old days of collodion.

RECOLLECTIONS OF THE FIRST PHOTOGRAPHIC EXHIBITION.

BY JOHN SPILLER, F.C.S.

At the time of my writing, the British public has the advantage of inspecting the fine collection of pictures constituting the twenty-sixth Annual Exhibition held under the auspices of the Photographic Society; and at this period it may not be deemed inappropriate to revert to some of the leading characteristics of what may be called the *first* public exhibition of photographs, for although the opportunity of inspecting and comparing notes will have passed away before these lines will appear in print, my remarks generally will hold good for all time, and serve, I trust, to heighten the interest felt in future exhibitions.

Although Daguerreotypes and sun pictures were shown in the Great Exhibition of 1851, conjointly with the apparatus for producing them, the collodion process had hardly yet come into practical use. It was known only to a very few amateurs, being quite in the experimental stage, and was scarcely employed at all within the precincts of the great building in Hyde Park. All the pictures taken by order of the Royal Commissioners were executed either on paper negatives or albumenized glass; these, the work of Mr. Hugh Owen and M. Ferrier respectively, were shown in the following year on an occasion which may fairly be described as inaugurating the first Photographic Exhibition. After a descriptive paper, read by Mr. Roger Fenton at a meeting of the Society of Arts, December 22, 1852, and illustrated by upwards of seven hundred photographs, the collection of "recent specimens of photography" afterwards remained on view for several weeks, and not only

constituted, as I have said, the first public exhibition, but actually led up to the formation of the Photographic Society early in the following year, when Sir Charles Eastlake, P.R.A., became the first President, and Mr. Fenton himself took the duties of Honorary Secretary.

That the collodion process *was* actually employed in the Great Exhibition building is proved by the fact that picture No. 339 in the old catalogue (now before me) was a "View of the Great Exhibition Interior," taken by Prof. P. H. Delamotte, and marked collodion; also by Nos. 238 and 261, "Taking down the Transept, Great Exhibition, Hyde Park"; collodion pictures by the same artist. Dr. Diamond exhibited his well-known "Types of Insanity," and portraits taken on collodion were shown by F. Scott Archer, T. Sims, F. Horne, E. Kater, and J. A. Spencer; but the bulk of the work displayed in the large room of the Society of Arts was from waxed paper, Talbotype, or albumenized glass negatives. The Count de Montizon, whom I well remember as a fellow-student with me at the Royal College of Chemistry, was the first to employ collodion, in 1852, at the Zoological Gardens; Mr. F. Maxwell Lyte began about the same time, and took out a camera with him to the Pyrenees; Paul Pretsch sent over some good work (paper negatives) from Vienna, and most of the English landscape photographers were using either the wax-paper or Talbotype process, Messrs. Ross and Thomson, of Edinburgh, having made for themselves a great reputation in working large plates of albumenized glass, Melrose, Holyrood, &c., being shown at the Society of Arts Exhibition.

Mr. H. Fox Talbot sent in a lot of "Early Specimens of the Art of Photography from 1842 to 1846"; Mr. G. G. Stokes exhibited a new form of portable camera, with hood for changing the papers. Sir Wm. Newton, George Shaw, Baynham Jones, B. B. Turner, P. W. Fry, S. Buckle, F. W. Berger, and Alfred Rosling were to the fore in the practice of the Talbotype process as amateurs; Roger Fenton, E. Becquerel, E. M. Regnault, Gustave le Gray, and Mr. Stewart, of Pau, preferring the waxed paper, which had an advocate also in the person of Mr. Stokes. Dr. Percy, Robert Hunt, J. D. Llewellyn, Francis Bedford, Peter le Neve Foster, C. H. Waring, and Sir T. M. Wilson were all practising photography at this period, but did not show anything at this first Exhibition; all their names appear, however, in the catalogue of the Photographic Society's first exhibition, held at the Suffolk Street Gallery in 1854.

It remains only to note that Mr. T. H. Hennah showed "Six Specimens of Tones of Printing"; that Mr. T. M. Goodeve exhibited prints on albumenized paper, and that MM. Ferrier and Martens each sent some marvellous specimens of photography on albumenized glass, almost rivalling the delicacy of collodion, to the Exhibition held at the Society of Arts. Mr. Roger Fenton's paper "On the Present Position and Future Prospects of the Art of Photography," occupies six pages, and the descriptive details from various exhibitors fill nine pages more of the quarto catalogue, 1852.

DIRTY WINDOWS.

BY T. BOLAS.

THE gelatino-bromide process has by no means done away with a necessity for taking advantage of any circumstance which can shorten the exposure, and as the public are now so thoroughly impressed with the possibility of taking a picture in less time than it takes for a bird to move its wings the eighth of an inch, or for a drop of water to part company with the spout of a jug, the photographic portraitist must study rapidity from every available point of view. Unless he does this he will be continually reminded that "Mr. Snooks took my darling Amy while she was playing with a cat, one paw of the animal being in the act of descending," or that "a friend of mine, who is *only an amateur*, can take people while they are walking about, and yet you keep me sitting for an age."

My own opinion is that, instead of the portrait lens being doomed, as some suggest, it will soon be more prized than ever: but to return to to the window question. Few who have not made experiments on the subject have any idea as to the enormous proportion of actinic light which is stopped by a window, unless it is kept in the most perfect condition of cleanliness. Between a piece of glass carefully cleaned with a mixture of ammonia, spirit, and rouge, and a similar piece exposed to the London atmosphere for a day, there is often a difference of thirty per cent. as regards actinic transparency, the experiment being made with rays which strike generally at right angles to the glass. If, however, the rays strike the glass plates obliquely, the difference in actinic transparency becomes greater. Some old experiments of mine proved conclusively that the gain in light attained by removing the glass entirely from a studio, the glass being, of course, as clean as care and labour could make it, was less in proportion than that effected by thoroughly cleaning glass of average dirtiness.

In short, the difference between perfectly clean glass, and no glass, is small compared with the actinic chasm existing between average glass as seen in an ordinary studio, and chemically clean glass.

A word as to cleaning. Ten parts of methylated spirit (not the so-called "finish"), one of liquid ammonia, and one part of fine rouge, answers admirably; every trace of the mixture being carefully polished off with a clean leather, as in preparing plates for wet-plate work. When wet plates are employed in the studio, it will often be necessary to omit the ammonia, in which case a mere trace of caustic potash may take its place—say, about ten grains dissolved in an ounce of water. Too much potash is liable to corrode the surface of the glass, and when once the natural surface is gone, the photographer had better get fresh glass at once. Plate glass is most unsuitable for glazing a studio.

PHOTOGRAPHIC RESIDUES AND WASTE: WHAT IS WORTH SAVING, AND HOW I SAVE IT.

BY PHOTO-CHEMICUS.

THE Editor having invited essays on the above subject, there is no doubt that he will receive many and valuable contributions; but they will be, for the most part, written from a *professional* point of view, and I cannot help thinking that a few remarks on the same topic, but written entirely as affecting the *amateur*, may not be without interest. For the treatment by professionals and amateurs must necessarily vary, because the circumstances vary. With the professional photographer a very large proportion of his waste consists of paper trimmings and print washings, and a comparatively small amount of spent hyposulphite and developer. With the amateur the case is exactly reversed, because, having obtained a successful negative, very few pictures are printed therefrom. With the professional man, therefore, it is easier, and pays better, to save most of his residues in the form of chloride, merely precipitating the hyposulphite as sulphide; while I will endeavour to show that it is far more simple for the amateur to utilize the whole of his waste as sulphide, which process needs none of the systematic plan required by the exigencies of a large business.

The plan I pursue in a mixed use of wet, as well as gelatine and other dry, plates of my own preparation is as follows:—Commencing with the manufacture of dry plates, after having been sensitized, they are washed over my waste tub, which is a butter-jar holding about six gallons. All plates, likewise, wet or dry, are developed, and the spent liquid emptied into the same receptacle, in the bottom of which I keep a pound or two of scrap zinc. The fixing solution of hyposulphite is not poured into this vessel, but set aside in either a jar or Winchester quart bottle, and continuously used till necessary to make fresh; but in washing the plates after fixing, it follows that, in course of time, a considerable quantity finds its way into the waste tub, dissolving part of its silver contents.

In printing, I always trim my prints before washing, and the trimmings are at once put into a box or drawer excluded from the light, while the print washings and old toning baths are added to the waste tub.

When the time comes, then, to utilize my residues—*i.e.*, when sufficient has collected—the following are the forms (in their order of value) in which I have to deal with them:

A. Old hyposulphite solutions.
B. Sensitized paper cuttings.
C. Waste tub.

I combine the three in one operation. The paper cuttings and spoilt unfixed prints (B) are placed in a pan, and all the old hyposulphite I have to treat is poured on them, and left all night. The next day this is poured off again, and the cuttings rinsed with water, which is added

to the hyposulphite. This is now precipitated with potassium sulphide, which is added in excess till it smells strongly. In a few hours all silver sulphide has subsided, the supernatant liquor smelling strongly of sulphuretted hydrogen. This is decanted, but not thrown away, and is carried down and added to the contents of the waste tub, thereby precipitating every trace of silver it may contain. The next day the contents of the tub are removed by a syphon, to the amount of three-fourths or even more, leaving it again ready for use. The deposit being small, it is only collected occasionally when it has accumulated to an amount worth saving.

The precipitate from the hyposulphite is now poured into a small flannel coffee-bag, washed by a stream of water, and (according to its quantity) is either kept there till dry, and put aside, or left till the next operation ; and when the residue of the waste tub is sufficient, this is also added.

By these means I consider that I have saved all my silver except that contained in print cuttings already acted on by light; and this is so insignificant as to be practically valueless—at least to the amateur. An old sensitizing or printing bath I treat exactly as hyposulphite, by precipitation with potassium sulphide. I need hardly add, that nothing in this process need prevent the paper cuttings being preserved and sold after their treatment with hyposulphite, if the quantity be sufficient to make this worth while.

But now comes the all-important question : the amateur having got his residues, "What will he do with it"? He may sell it to the refiner. Let him! I prefer to refine my own. But he has no apparatus. He does not want any. Let him get a Hessian crucible, which will cost him 3d. or 4d., and his refining furnace is complete. I proceed as follows: I take my residues (as dry as possible), and mix them with a third of their weight of powdered nitre (saltpetre). Having heated the crucible to as great a heat as I can in an ordinary fire, I throw in the mixture a little at a time ; deflagration takes place like miniature fireworks ; when this has ceased, more is added, till the whole quantity has been treated ; and if the operator can obtain sufficient heat (say) with a boiler fire, or any other with a good draught, he will soon find an ingot of silver at the bottom of the crucible; but even in an ordinary fire he will, owing to the intense heat evolved by the nitre in deflagration, find a semi-fused mass, containing particles of silver; and I find that, by simply soaking this for a few hours in water, to free it from any potass left by the nitre, I can at once, by dissolving it in nitric acid (dilute), prepare my own nitrate of silver without difficulty. The insoluble residue left after treatment with nitric acid should be carefully preserved, because, small as it is, it contains the whole of the gold which has accumulated in the residues, and in time may be dealt with separately.

The above account may seem tedious, but it is wonderful how little the actual time of the operator is occupied in the process.

THE ELECTRIC BELL IN THE STUDIO.

BY NELSON K. CHERRILL.

A FEW days ago, when calling upon an old friend in one of the best appointed West End studios, I was surprised at the absence of any system of signals to acquaint the proprietor with what was going on in the reception-room. In the course of five minutes' conversation with my friend, a young lady was sent up to say that "the ladies had come to appointment," and a minute after, she came again to say that a gentleman had come in, who would, however, wait till Mr. —— was disengaged. Of course I left at once. Chance took me, not an hour after, to a large drapery shop in Regent Street. The ladies I was with mentioned their requirement in brief to the shop-walker. Our party was directed to walk upstairs and enter the second department on the right; arrived at our destination, the young lady in attendance there seemed perfectly acquainted with all our wants, and had, indeed, the goods we came to look at already in her hands. Was this a spirit of prophecy, or a good business arrangement? A little silver-toned electric bell answered the question by two or three strokes on the bell, then a pause, then two more, and a moment afterwards a very grand lady coming into the department was at once accosted by one of the attendants, "Your ladyship will find mourning caps at this counter." Here was a practical lesson in saving time and trouble. What could be simpler than to adopt such a system for the studio? The bell-pull in the reception room, the little silver bell in the dark-room or studio, and the whole history of customers' wants can then be expressed in half a dozen signals, learned in five miuutes, while the system is calculated to save hours of valuable time every month it is in operation.

WHAT NEXT?

BY J. WERGE.

WHEN a man has seen the most beautiful of all photographic processes—the Daguerreotype—appear like a phantom, grow into vigorous beauty, and become totally extinct in little more than a decade of time, and seen it hustled with unseemly haste into a premature obscurity, to be superseded by a sloppy, slip-shod substitute of infinite form and variety, he naturally asks himself the question, "What next?"

When the question is answered by the introduction of another process, not quite so sloppy, but equally slip-shod, and more exacting in its manipulative conditions, he is more likely to ask himself the question, "What next?" But, when a man has seen photography pass through all its phases, from its birth to its present state, and worked and waded through all the numerous processes—practical and impractical—that have been introduced during the last forty years, without arriving at finality, or satisfying the cravings of the world, he is still more likely to exclaim, "What next?"

All the most likely and most available mediums have been employed, but neither silver plates, silvered paper, albumen, collodion, nor gelatine have given entire satisfaction, either to the photographer or the public. The results obtained on silvered plates by the Daguerreotype process afforded the photographer the greatest amount of pleasure and satisfaction; but, unfortunately, the public did not participate in his enjoyment. The best forms of glass positives most approached the beauty of the Daguerreotype, and were more acceptable to the general public, because they could be seen with greater ease and comfort. Positive prints on paper, and especially the "carte-de-visite" form, became popular with the public because of their portability, or easy transmission by post, as well as their comparative cheapness, and numbers obtainable from a single sitting. The carte-de-visite, despite the many modifications of size and form, continues to be the most popular photograph of the day; yet neither the photographer nor the public are satisfied. There is still a craving in the minds of both for something more.

The photographer was never able to produce his negatives with so much ease and rapidity as now, and at less cost to his sitters' time and patience; but he finds out his weakness or the non-progressive state of his art in the slow production of his prints, and neither he nor his sitters can good-naturedly brook the—at present—unavoidable delay in the delivery of the finished photographs, especially during the dark and dull season of the year. All the efforts at printing by development that have been recently introduced have proved unsatisfactory and disappointing, both to photographer and patron, particularly in the production of small work; and silver printing, with all its tedious operations and innumerable drawbacks, continues to be the printing process of the day, and with very little modification since its earliest introduction; and it is in this direction that the question, "What next?" should be answered, for both the producer and consumer (commercially speaking) are weary of waiting, and the interest of one and the gratification of the other are both seriously damaged by the slow productiveness of silver printing.

On the other hand, the public are weary of the monotony of monochrome, and run greedily after clap-trap announcements of "Photography in Natural Colours," hoping to obtain the beauty of finished and costly miniatures (without the defects of nature) at the price of an ordinary photograph. That, of course, is unreasonable; but the public knows no better. It shows, however, that the world is ready to run after an attractive novelty, and especially the novelty of natural colours. With our present knowledge of photographic optics or chemistry, there is little or no probability of polychromatic pictures being obtained in the camera direct; but there is unquestionably, at the present time, an immense amount of chemical and scientific knowledge in the world that is lying latent or dormant, as far as photography is concerned, for want of a proper stimulus; but that stimulus could easily be supplied, and the esults might be superb, if not stupendous.

There must be at least fifty thousand photographers in the world—and that is a very low estimate, for there were thirty thousand photographers in the United States alone a few years ago, and the number is not likely to have diminished—who might easily raise a fund of sufficient magnitude to tempt the highest intellects in the whole civilized world to enter into competition to solve the question of "What next?" If each photographer of the present day were to subscribe but one guinea, a sum of five thousand pounds could be raised in the United Kingdom alone, or fifty or sixty thousand pounds by the whole world could be raised to establish a fund to reward any chemist or scientist who would turn his attention to the wants of photography, and if "photography in natural colours" were not the outcome of such an intellectual contest as fifty or sixty thousand pounds would stimulate, some quicker, easier, and more permanent process of photographic printing might be the result.

At any rate, the effort should be made, and the cost would be trifling—individually. Two rewards might be offered, one of five thousand pounds—say, as a reward for the discovery of an improved printing process, and another of forty or fifty thousand pounds for the discovery of "photography in natural colours;" but the first thing to be done is to raise the money, appoint trustees, and have it safely invested as a guarantee to all intending competitors.

This suggestion, though stupendous, is neither extravagant nor impractical, and there is nothing so likely as a magnificent monetary reward to induce the most cultivated chemists and profound scientists to turn their attention to a solution of the photographic problem of "What's next?"

BUBBLES.

BY CLIFTON CLIFF.

Much has been said and much has been written on the question of "bubbles." Nothing is more vexing or more calculated to make a silver printer use unparliamentary language than to find a batch of good prints smothered with bubbles large and small. I have personally given much time to experiments having for their object the discovery of the cause or causes of these ever-recurring nuisances. Most photographers blame the paper (it being very convenient to put the cause of the failure on somebody else's shoulders). I did the same once, but experience has taught me that the paper is not to blame. The whole fault lies in the hyposulphite, or rather in the strength of the hyposulphite. Reader, are you troubled with bubbles and blisters? If so, just add a little more water to your soda, and you will see no more of them. Prints will fix just as well in weak hyposulphite as in strong—some say better; and, as a matter of fact, I have found that with a weak solution, bubbles never appear. This is a very simple remedy, and, being such, it is a wonder it has never been proclaimed before; however, better late than never. Try it, and if you don't find it succeed, your experience will very much differ from mine.

PEOPLE WHO LIKE BEING PHOTOGRAPHED, AND PEOPLE WHO DON'T.

BY CHARLES PEARCE.

Being photographed, it may be safely said, is not one of the ruling passions of the human breast. Many persons look upon a photographic studio with horror, and nothing less than physical force can induce them to set their foot inside. Even those who are anxious for their photographs regard the operation with a certain amount of nervousness, and are glad when it is over. Children detest it, after the first sensation of novelty has disappeared, and the stock of toys—which are only to be looked at from a particular chair, and are not to be touched—is exhausted. Even the professional beauty cannot say she absolutely likes the ordeal, though she may get used to it, and comfort herself with visions of the admiring crowds who will gather round the shop windows to stare at her latest pose. Why is this? Is it such a dreadful thing to sit on a chair for ten or twenty seconds that it inspires the majority of people with a kind of morbid dread? Are photographic studios halls of dismal gloom upon which should be inscribed the Danteian motto, "All hope abandon, ye who enter here"? Is the photographer a species of ogre, who petrifies all he comes in contact with? The mystery is one we would fain seek to fathom, yet the solution is by no means easy. A biographer of the late A. T. Stewart, the Whiteley of New York, whose body was stolen from its sepulchre, and has never been restored, says:—"A striking peculiarity in Stewart's character was his objection to sitting for a portrait. He was often importuned by his friends, but always refused, his reply being of an evasive character. He did not have time. He preferred to wait, and thus he avoided the application. The fact is, he had an indescribable repugnance to portraiture, and hence would not even allow himself to be photographed." And then the writer adds, with rather a superficial knowledge of human nature—judged, at least, from our present stand-point—"Had Stewart been deficient in personal appearance, there might have been some reason for this; on the other hand, he was rather a fine looking man." Now, this is just the point we dispute. It is *not* the ugly people who object to having their portraits taken. Oliver Cromwell requested to be painted with his warts, and the painful experience of photographers is that they have more plain sitters than handsome ones. The truth seems to be that neither good nor bad looks influence people in regard to being photographed. "George Eliot" had an unconquerable dislike to the camera, but it would be unfair to accuse the great novelist of vanity, because she did not like to see her somewhat plain and pronounced features reproduced by photography. We are inclined to think that, saving Royalty, who is photographed because Royalty is generally good-natured, and likes to oblige the enterprising and pertinacious photographer; and actors, who are photographed because of the good advertisements photographs make, those who are most addicted

to having their portraits taken, and who, of all others, can be said to like the operation, are the inane common-place people who are neither strikingly handsome nor abominably ugly. Those smug smiling persons, whose adamantine coverings of self-contentment nothing can remove, whose expressions never vary by a hair's-breadth from their dead level of satisfied uniformity, and who only have one opinion of themselves, which opinion they are under the fond delusion of imagining all their friends also hold; *they* are the sitters who go again and again to be photographed. And if we advance a step further, we shall, perhaps, see the reason of this.

The Autocrat of the Breakfast Table puts the case thus: there are at least six personalities distinctly to be recognized as taking part in a dialogue—say, between John and Thomas.

THREE JOHNS.

1. The real John; known only to his Maker.
2. John's ideal John; never the real one, and often very unlike him.
3. Thomas's ideal John; never the real John, nor John's John, but John very unlike either.

THREE THOMASES.

1. The real Thomas.
2. Thomas's ideal Thomas.
3. John's ideal Thomas.

Now, we do not see why this multiplication of one's personality should not apply to the ordeal of being photographed. When John has his portrait taken, he desires to be represented as his ideal John. Let John look in a mirror; it is the ideal John that he sees. He has a favourite expression by which he fancies his friends best know him—*i.e.*, the expression which he himself likes best. But in the studio he has no chance of calling up the favourite aspect, and not knowing what Thomas's ideal is, the result may be neither John's ideal John, nor Thomas's ideal John, but something quite different from both. Whether the real John ever appears we dare not say, as the question is one obviously impossible to decide. The point we wish to arrive at is this: Does John's dislike to being photographed arise from his fear that his portrait may not be like the ideal John? It often happens that John finds fault with his portrait when his friends think it very good. If John is a man of common sense, he will accept the verdict of others, and quietly confess to himself that Thomas's ideal John is not quite so good-looking as John's ideal John. If, on the other hand, he is vain, he will attempt to obtain a picture of his ideal, which, if he succeeds in getting, will most assuredly be condemned by Thomas. It is, we fancy, from not grasping thoroughly the principle of this dual personality that the objections of the majority who do not like being photographed arise. They do not care to be exposed to the risk of being represented by a picture which is certainly not their ideal, and they are not aware that

this unlike portrait may in reality represent them perfectly in the eyes of their friends. Of course, the argument is at best only an hypothesis and, like most hypotheses, may be upset by a stubborn fact; but until a better one be found, perhaps, like Mercutio's wound, "'t will serve."

VISIBLE PRINTING ON GELATINO-BROMIDE FILMS.

BY RICHARD PARR.

DURING the past year I have been working at the preparation and washing of silver bromide before its addition to the gelatine. So far, I have not been able to secure a sufficiently fine grain to bear enlarging twelve to fifteen diameters, and as I regard this as a *sine qua non* for small plates, I have come to the conclusion that it is not possible. Of course it can be done by using very weak solutions of silver and bromide, but such may be regarded as more fitted for a laboratory experiment than for actual practical working.

On preparing silver bromide from pure bromine and silver oxide as follows:—Saturated solution of bromine in distilled water three drachms, glycerine one ounce, gum-arabic three drachms, and water six ounces, mixed, and then ten grains of silver oxide (thrown down from a weak solution of silver nitrate by a solution of caustic potassa) added, and shaken at frequent intervals for six days—I obtained an emulsion of a light grey colour (ruby by transmitted light), which printed under a negative by daylight to a dark iron grey, but refused to develop by either alkaline pyrogallic or ferrous oxalate. On digesting some of this bromide in ammonia solution (·880) half an ounce, water half an ounce at 100° F., it went several shades darker, and was about half as sensitive as ordinary wet plates, but it printed under a negative in daylight slatey blue.

I next tried preparing the bromide by dissolving ten grains nitrate of silver in one ounce of distilled water, and precipitating it with a solution of Howard's bicarbonate of soda, washing and adding it to a mixture of distilled water one ounce, with saturated solution of bromine two drachms. After shaking well three or four times a day for three days, I washed and emulsified it, getting an emulsion of a light primrose colour, dirty green by transmitted light, and which printed under a negative in daylight to a dark coffee-colour, but was reduced by the developer very slowly without any indication of fog; some of the bromide boiled in ammonia solution (·880) half an ounce, and water half-an-ounce, for ten minutes, gave an emulsion of a cold green grey, and printed in daylight under a negative to a dark violet; in fact, it printed right out like a silver print. It was about as sensitive as a wet plate, with no inclination to fog.

There is nothing very useful in this, but as I am not aware that gelatino-bromide has been found to print out by daylight before in this way, you may perhaps think it worthy of mention in the YEAR-BOOK.

ABOUT GELATINE PLATES.

BY R. R. BROWN, JUN.

My experience of the various makes of plates with which the market is stocked, has proved, at the end of a season's work, to be diametrically opposite to what I supposed at the first it would have been. I find that some of the cheap makes (up to a certain size) are quite as good as the more expensive ones.

Most of my work this season has been of the instantaneous class, which is now reigning in such a despotic manner over photographers. I have used a drop shutter, plain and simple, fitting on the hood of the lens, having an adjustable opening, and working in about the tenth part of a second. It may appear strange to those who have been accustomed to work with the "rapid" class of lens to hear that I have never, in one instance, used a more rapid class of lens than the portable symmetrical; and in some instances of breaking waves I have used the third stop, and have not lost half-a-dozen plates throughout the season by under-exposure. The great advantage to be gained by using this class of lens is, that there is not that falling-off of definition towards the corners of the picture.

Regarding the development of gelatine plates, I never could understand how any strictly set formulæ for developers could be suitable to all makes of plates. I have used a developer in which the pyrogallic was dissolved in spirit. Now, with a certain make of plate I could get any sort of negative I wished with it, either hard or soft; while with another make I could only get poor foggy negatives, totally unfit for printing.

I have found the use of a solution of alum and citric acid of great use; it effectually clears all yellowness from developed plates, caused by too long immersion in a discoloured solution of pyrogallic acid. It is a wise precaution to soak the developed negative in a strong solution of alum previous to fixing, but this I have not found absolutely necessary. I always use alum after fixing; it destroys all trace of hyposulphite, and in a measure does away with the necessarily long washing that the films have to be subjected to.

When I was troubled with frilling, I tried soaking the plate, after exposure and before development, in a weak solution of chrome alum, but found it had a tendency to cause mottled markings on the film; also, if the plate was not lowered steadily down into the solution, a sharp line was caused where the flow of the solution was checked, just as in the old wet plate times when a plate paused during its journey into the mystic depths of the silver bath.

There are many complaints made about mercurially intensified negatives fading, but I have many a dozen intensified in that way, and not one shows the least sign of changing colour. I believe that the whole of the mischief is caused by too little washing. Most of the diseases that gelatine plates are heirs to may be remedied by the cold water cure.

You cannot wash the emulsion or plates too much, especially between fixing and intensification.

The formula for intensifying that I prefer is the cyanuret of silver one, not the ammoniacal one. With the former you get a purple tint very non-actinic; by its means I have saved many an otherwise worthless negative.

TWO PLACES IN NORTH WALES.

BY H. D. L.

MOVED by a glowing description of Llanrwst, North Wales, in the YEAR-BOOK for 1881, I settled to go there, on photography bent, for my fortnight's holiday. I had arranged to call for some uranium dry plates at the Liverpool Street terminus *en passant*; but, alas! forgot to do so till I reached Euston. Having arrived there, I hurried back for the plates, and just succeeded in returning to the platform soon enough to secure my train. An anxious time was that half hour, as to miss that train meant a day's delay! No further mishap occurred, and I was safely deposited at Llanrwst on Monday evening, 11th July. My camera was an 8 by 5, packed with one double back in a small box with handle, and in another similar box were five double backs.* The top of the camera stand was screwed on to the side of the box, while the legs folded up. I may also mention that I brought my old wet-plate tent for changing and developing in my lodgings. At one time I thought it had been rendered useless by the introduction of dry plates, but I soon rejoiced in its possession.

Well, I began work on Tuesday morning, but quickly found—perhaps through my own want of artistic feeling—that the praises of Llanrwst had been too highly sung. Four views can be taken within sight of the bridge—one of the bridge itself, one from each side of the bridge, and the fourth from the west side of the river below the old church. Crossing the bridge, past the White Tree, you come to Nant Cottage. The road looking upwards, with the cottage gable peeping through the trees, tempted me; as also did the front view of the cottage. A lane goes from it to Trefriw, containing subjects for at least half-a-dozen plates. All the views now mentioned can be taken in one day.

Another day's excursion is by the new bridge, through Trefriw, to the Dolgarrog and Porth Llwyd Waterfalls (two plates for the former, many for the latter two) may be additional subjects for the photographer in the distant lakes and mountains; but I doubt whether they will repay the necessary labour. I tried Lake Geirouydd, but when I reached it, after a weary march, I regretted that I had strayed with my traps so far. I have said as much as I justly can of Llanrwst. Three days there ought to be enough.

On Monday, 18th, I went on by train to Bettws-y-Coed. Here,

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* I intend, in future, to have only one box holding camera and three double backs, the lens being carried separately.

indeed, the camera is in its right place. The photographer will find that many of his brethren have anticipated his subjects; but still, in spite of their numbers, he also will find abundant scope for originality. *1st Excursion.*—Through the wood, or viâ Waterloo Bridge, to the Fairy Glen, one mile and a-half from the village: time to be there, not later than 3 p.m. *2nd Excursion.*—Beyond this, to Pandy Mill; views on both sides of the river; morning and afternoon; lovely bits. *3rd Excursion.*—About a quarter-of-a-mile in neighbourhood of the Miner's Bridge will provide some in the morning about 9·30 a.m., and some in the afternoon; beautiful subjects. In the interval thus allowed, the Swallow Falls, not omitting the charming glen which you see when your back is turned from them, may be photographed. *4th Excursion.*—Take the path leading up the hill behind the new church to Lake Elsi. Two or three views may be obtained from this path, showing well the character of the country. Lake Elsi itself is more suitable to the painter than to the photographer. Another day may be well spent in securing pictures of Pont-y-Pair (both sides), with views from the bridge, looking West, and also of the river further down from the front of the "Royal Oak."

My second week was now exhausted, and I reluctantly gave up North Wales *pro tem.* It remains only for me to record the satisfaction which I experienced in having my tent. I erected it in my lodgings, and kept it up the whole of my stay, so that it was always ready. At spare moments I would change and develop; and every dry-plate worker will sympathize with my delight when I thus found out for certain that I was able to add another good negative to my stock before my departure from the place rendered renewed efforts impossible.

I will just add that, in printing these negatives, I have found the Platinotype process, in many cases, give me results far superior to what I could have obtained on albumenized paper.

ENLARGEMENTS ON GELATINO-BROMIDE PAPER.

BY H. WILMER.

THIS process is so simple and inexpensive that it ought to become a favourite among amateurs. The method I employ requires very few appliances, and is easily carried out. When quarter-plates are to be enlarged, a lantern with a paraffin lamp and a condenser is sufficient; but with anything larger, daylight is necessary. My dark-room window is covered over with a light frame, over which brown paper has been stretched and glued. Across this I have fixed two light rails about five inches apart, and on these is screwed an ordinary half-plate printing-frame. The brown paper has been cut out from behind the frame, and the joints made good by gluing strips of paper round the frame. When not required for enlarging purposes, the back is fixed into the frame, and, if white light is required at any time, the frame will do duty as a window.

At the back of the window is a board fitted with runners, on which slide two uprights about six inches wide—one to carry the lens, and the other the sensitive paper. The front upright is connected with the printing-frame by means of a light bellows consisting of a square, black twill bag, kept open by pieces of wire bent into a square, and stitched into the bag at intervals of about two inches. Between each pair of wires is stitched also a piece of thin, black elastic. The end of the bellows fitting over the printing-frame has a strong elastic band, and the other end, which fits over the lens, is formed into a sleeve, and kept tight by means of an elastic.

The focussing is performed on a sheet of glass, over which has been stretched a piece of black carbon tissue. The plate is supported on a rebated rail screwed across the upright, and kept in place by two wooden buttons.

When an exposure is to be made, the negative is placed in the printing-frame, and kept in place by two buttons; the bellows are adjusted over the frame, and the view focussed on the plate of glass. The lens is then covered up from the back, and the paper soaked for a few minutes in plain water, after which it is stretched on the reverse side of the focussing-screen.

The rest of the manipulations are similar to the instructions sent with the paper. I generally use the oxalate of potash and ferrous sulphate solutions in the proportions of about 5 to 1; but do not find the addition of hyposulphite of soda of advantage, as it tends to discolour the high-lights.

A STANDARD OF COMPARISON FOR LENSES.

BY W. K. BURTON, C.E.

ABOUT eight months ago, in the PHOTOGRAPHIC NEWS, you gave an article with the above heading. As the suggestion for a standard contained in that article was, I believe, based upon a calculation made by me establishing a relation between the brightness of an object and the brightness of image given by a lens, I should like to say a few words on the subject, which I consider a most important one. The unit which you propose is the brightness of the object. I quote the following from the article referred to:—

"Let f be the equivalent focal length; d, diameter of aperture; x, brightness of image in terms of brightness of object. Then we shall have, $x=(\frac{d}{2f})^2$. All that would be necessary would be to stamp on every lens and on every stop a figure representing the result of working out this extremely simple formula, and then the photographer would have nothing to do but to read this figure, and he would know exactly what was the rapidity of the lens used with that diaphragm, and there would be only one factor left to judge in making an exposure—viz., the amount of light in the studio or in the field. . . He would have with respect to his lens no calculation whatever to make. He would simply know

from reading the figure on the stop he had inserted that the image on the ground-glass was so many times less bright than the object focussed."

I have only one objection to this proposed standard, and that is, that it is too small a unit. It would involve a set of figures which are too high. The standard proposed practically is $\frac{f}{\frac{1}{2}}$, that is to say, it is proposed to compare all lenses with a hypothetical but impossible lens whose diameter is twice its focal length. The effect of this would be that for such stops as those used with some of our landscape lenses we should have to use such figures as 6,400, and 14,400, which would look rather startling.

I consider that a better basis for a standard than you propose could not be found; but I consider that it is too small for a unit. It would be as if we had to state the distance between London and Edinburgh in inches. What I would suggest is this: that the standard lens should be one which would give an image one hundred times less bright than the object, and that, if possible, a name should be coined indicating this relation. Such a lens would be one with a working aperture a fifth part of the focal length, or $\frac{f}{5}$, and it seems to me that this would form a thoroughly practicable unit.

I believe that it has been proposed that there should be a committee of the Parent Society to consider the subject of a standard for lenses. I would urge upon them the desirability, if they do establish a standard, of having it other than a totally arbitrary one. I am well aware that, as a practical matter, one standard, if once established, would be about as good as another, and if there were a standard in existence I would be the last to suggest that it should be altered merely for the sake of establishing a hypothetical relation. I would as soon think of suggesting that the English inch should be altered so as to make it be a definite fraction of the diameter of the earth; but there is no standard for the comparison of lenses, and it is now suggested that a scientific body of photographers should for the first time establish one—it will be as easy for them to make it one thing as another. Do not let it be possible for future generations to point to them and say that, when a body of scientific Englishmen set about to look for a standard measure, they could think of no more scientific a basis for it than that it so happened that in Mr. Smith's or Mr. Jones's lenses the largest diaphragms bore such and such a relation to the focal length! The arbitrary nature of our English standards of distance and weight make us the laughing-stock of the rest of the scientific world. Let us not add one more to them.

I have heard various units proposed, and reasons of a kind given for adopting them. $\frac{f}{4}$ has been suggested because it is about the usual ratio of the full aperture of a portrait lens to its focal length; but many portrait lenses have larger, and many smaller, apertures. I have heard $\frac{f}{2}$ suggested, because it is said that this is the largest aperture

that any lens works at, and because it is thought by some that the unit should be so small that it should be unnecessary to use less than whole numbers on the diaphragms. I do not know of any lens which works with so large an aperture as $\frac{f}{2}$, but there may be some. I certainly do not see any objection to going into decimals in the case of very rapid portrait lenses, especially as I believe the days of portrait lenses, except for very exceptional work, are numbered. We must either have fractions in the case of rapid lenses, or very high numbers in the case of the smaller stops of our landscape lenses. I have heard $\frac{f}{10}$ proposed—I do not know for what reason, except that it looks neat. I do not think any of them are as good as the one I now suggest. Were it introduced, the unscientific photographer who shuts his eyes to all possible information would be no worse than with any other standard; whilst the scientific man would have the definite piece of information given to him, every time he inserted a stop into the slit of his lens, that the image given by it on the ground glass was so many hundred times less bright than the object he was about to photograph.

ON THE DISPLAY OF PHOTOGRAPHIC PICTURES.

BY THOMAS PEARSALL, F.C.S., ETC.

THE general effect of the Exhibition of 1881 is of a quiet, pleasing character. Before looking at any single picture, the visitor is impressed with the appearance of the room; nothing obtrudes itself; there are no startling margins of mounting, no vivid colours, no unusual framing or fanciful combinations of mounts and frames—there is sufficient repose, and the collection looks well.

There have been occasions when the loud colours and disproportionate mounts and frames have raised the question as to proper display of photographic pictures; and while the photographic press have, at various times, called attention to the apparent disregard of standards of taste, the general body of exhibitors have shown consideration and improvement in their selection of means to display their exhibits this year.

It is probable that other exhibitions may have also impressed photographers, where the promoters distinctly announced that the very reception of a subject was, in the first instance, dependent upon uniformity of spaces, and of margins of frames, no pictures (whatever the talent shown) being admissible but those which followed the prescribed margins, materials, mounts, and frames. The 1881 Exhibition in Pall Mall has an elegant, uniform, tasteful appearance, unbroken by massive frames and great enlargements of some subjects.

At a recent meeting of the Photographic Club, the subject of mounts and margins was discussed. A written question had been submitted, viz., "What is the best colour for the mount of a photograph, the print being warm in tone?" The question might have been stated with

more particulars. The speakers agreed that a *warm* print should have a warm-tinted mount; that a *cold* print should have a cold-tinted mount. In all cases, no mount should be lighter than the highest light of the picture ; thus at once the question was raised as to the general use of *white* mounts, and of absolutely white mounts. Pure white should be avoided. It was urged that the *picture* subject was the important object, and that everything else should be subordinate, and it should not be depressed by surrounding it with the purest white. In the absence of true nomenclature for whites and light tints and degrees of whiteness, the white sought for mounting a work of art should, as the French say, be a "degraded" white—in fact, a dirty white—and the tone of white to be guided by the colour of the photograph. A dirty white, then, is to be preferred to the purest white. Cream colour is unsuitable; the tints of primrose, yellow, cream, and buff, by their quantity of tint and extent of surface of the mounts, often overpower the picture. Instances were quoted where *black* had effectively been employed. Gold often has damaging effects; besides, considering it in harmony or contrast with the subject, gold often shows cutting effects of certain lines and partial forms, dependent upon the appearance of brilliant gold at certain angles that distract attention from the picture subject. If brown, maroon, or olive green, or grey, then of the tints selected none should be so light as the lightest tint of the photograph, nor so dark as the darkest shades of the picture.

PHOTOGRAPHIC BLURRING *V.* ARTISTIC BLURRING.

BY ANDREW BOWMAN.

Between the kind of blurring produced by the photographic artist's lens, and the blurring or softening and blending practised by painters in their works, there is little or no relationship, unless it be with regard to aerial perspective in landscape, which the better class of view lenses render with great accuracy. The great defect in the portrait lens—as the merest tyro in the photographic art knows—is that it has only one plane optically sharp, all in front and rear of that plane rapidly passing into blur, and finally, obliteration of all form, relief, and outline. Increasing the diameter of the lens only increases the evil, and brings its inherent defects more prominently into view, such as the shortening or rounding of a long face, the thickening and consequently apparent shortening of the nose, and the conversion of the hairs of the beard into the semblance of cordage, &c., through the extraordinary diameter of the lens compared with "that of the human eye" seeing by means of its marginal surface too far round objects less than its own diameter, and too much of objects greater than itself. In other words, it sees single objects from too many points of view all clustered together within its own circumference.

The painter is not hampered in this way in his work. He may have different degrees of sharpness in different parts of the same plane, near

or distant, for the purpose of bringing some particular feature of it into more prominent relief, or to heighten the general effect. The blurring he practises is related more to aerial perspective than to optics, because the eyes have the power of changing their focus and degree of convergency with such rapidity that he can see at a glance any plane of an object equally sharp. Although the painter sketches near objects, "such as the head of a sitter," as seen with one eye closed, what he really tries to depict on his canvas is the semblance of the relief produced by binocular vision, subordinated only to the laws of pictorial representation. And for this very reason, "paradoxical though it may seem," if we wish to form a correct estimate of his success in this respect, we must view his work with one eye closed, or, better still, through a tube which will exclude surrounding objects from view, and cut off all extraneous rays of light from entering the eye except those which are reflected from the surface of the picture. For when viewed with both eyes, they constantly try to destroy the illusion, by telling us that the picture is a flat surface, and that the objects depicted on it have no relief at all. Because their relief is only virtual, therefore, the eyes do not require to change their focus and the convergency of their axis when directed to any point near or distant in the picture to see it sharply.

The blurring or spreading of the outline in paintings produced by breaking or intermixing of the colour of the flesh and drapery with that of the ground, may vary from a line to a quarter of an inch or more in different parts of the outline of the same figure, according to the degree of definition or the effect of melting away intended to be produced, especially in pictures painted on a low key, where the shadowy parts of the one merge into that of the other. Although this intermixing of the colours is technically called "uniting," it has in reality for its object the separation of the two, so that the ground may appear to recede, and the flesh appear to round away in atmospheric space, so that by this device, if it is well executed, the effect of perfect relief is obtained.

A photographer unacquainted with the technical artifices resorted to in the production of a painting might readily enough suppose that this blurring is an imitation of the spreading of the outline he sees in the most distant parts from the focal plane, in large bust portraits taken direct with large portrait combinations; but that is not so. Viewed at a proper distance, the blurring in the painting disappears, and perfect relief and definite outline take its place; whereas in the photograph it remains blur, and nothing but blur, at whatever distance it may be viewed. For the reason that a single portrait lens, though its diameter may vary from two and a half inches—the average distance the eyes are asunder—up to nine inches, cannot transmit the full effect of binocular relief, any more than a single eye can transmit the sensation of it. Though the portrait lens, by means of its back combination, can see a wider field moderately sharp, the eye has the advantage over the mechanical instrument of seeing objects as they are more perfectly, from the smallness of the diameter of its lens, which is a highly elastic substance, and which, by means of the suspensory ligament which holds it in *situ*,

can change its focus at will by altering its convexity, and in conjunction with its self-adjusting diaphragm, the iris—two qualities the optician can never hope to imitate—makes it serve all the purposes of the photographer's whole stock of lenses rolled into one. The image impressed on the sensitive plate in the camera is transmitted by a rigid instrument which, "unlike the eyes," is limited in its focal range. The image impressed on an artist's mind, through the eyes, is the product or sum total of a survey of the object from its nearest to its most distant visible point, perfected by the duration of the image on the retina. It is this mental image which the painter tries to depict on his canvas, but, "unlike the camera," not what he can see with his eyes converged on any single point of the object. The painter may fail from want of skill, the photographer's efforts are baffled by the instrument he is obliged to use.

Sir David Brewster more than a quarter of a century ago demonstrated that the highest possible artistic results can only be obtained by a lens of the same diameter as the lens of the eye. Although the subject is an old one, a couple of his more striking proofs briefly stated may not be out of place in a photographic annual like the YEAR-BOOK, as there are always fresh recruits joining the ranks of the photographic art, to whom an old subject is new. He says: "If we use a lens three inches in diameter stopped down to a quarter-inch aperture, we will obtain by it an approximately correct picture of a person sitting for his portrait, or of any object in relief. If we now move the aperture one-and-a-quarter inches from the centre toward the margin of the lens to the right, and afterwards move it the same distance toward the margin to the left, and take a picture through each margin, we will find on examination that we have obtained three distinctly dissimilar pictures. Indeed, the right and left hand pictures being taken through points two-and-a-half inches apart will be sufficiently dissimilar to give a solid figure in the stereoscope. And as the quarter-inch aperture can be placed in about 130 new parts within the circumference of the lens, it follows that a picture taken with its full aperture will be a conglomeration of 130 dissimilar pictures, no two points of which are coincident, or, to use the language of geometrical perspective, the photographic picture is a combination of 130 pictures of the sitter taken from 130 different points of view. A perfectly correct picture is one obtained by the smallest possible lens, or from a single point of sight in the centre of the aperture."

Then, again, as a more striking illustration of the distortion produced by large lenses, he says: "Let us suppose that we take a picture of the Jerboa, or leaping hare, as figured by Buffon, with a lens eight or nine inches in diameter. The animal is about four or five inches in breadth; and in a front view of it, when standing on its hind legs, its long tail is entirely hid by its body from the photographer's view; but the giant eye of the camera sees its tail by means of its marginal surface, and will give him a picture of the Jerboa with its tail in front of its stomach, or, what is the same thing on a plane surface, with its tai

seen through its stomach. For the same reason all objects less than eight or nine inches the diameter of the lens will be transparent to other objects situated at certain distances behind them." The advantage of Paddy's gun, which was constructed to shoot round a corner, will be obvious, especially in these days. when he is clamouring for the three F's. But from the above it will be equally obvious that a photographer's lens, which can see round a corner, possesses no pictorial advantage whatever.

The moral of all this is, that if we wish to successfully attempt certain pictorial figure subjects which come within the range of photographic means of representation, without resorting to combination printing; or moderately large direct bust portraits, which will require the least amount of retouching on the negatives and proofs to correct the deficiency of the lens (for nowever necessary retouching may be, it more or less detracts from the photographic character of the work); or if we wish to produce perfecter small negatives, suitable for enlargement to life-size pictures, which are not intended to be buried under oil paint; we must use smaller lenses—such as an adaptation of the view lens—for portraiture in good light, now that we have acquired a new power in the gelatino-bromide process.

HYPOSULPHITE IN SAFETY.

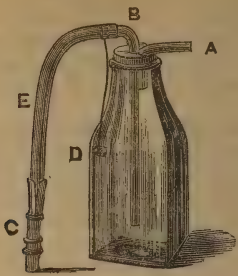
BY J. F. HACKETT.

MANY photographers have a great objection to hyposulphite of soda for fixing negatives, &c., owing to the mischief it would cause if any of it should get into the negative bath, developer, &c.

I find the following the best, safest, and most convenient way of using the above—or, indeed, any other—fixing agent, especially in a tent, as it entirely prevents the foregoing and many other annoyances. Procure a wide-mouthed pickle or any other glass bottle, two pieces glass tube ($\frac{1}{4}$-inch bore), some india-rubber tubing (the exact length depending upon the depth of the bottle, and the height it is placed above the sink), a bung to fit the bottle, and a cork to fit the A glass tube, which is to prevent the solution escaping when travelling.

First cut the bung to fit the bottle tightly; next cut or burn two holes in it (one at each side, about three-eighths of an inch from its edge) for the pieces of glass tubing to pass through, the tubing being bent (as shown in the diagram). The piece of india-rubber tubing is now slipped on the glass tube, B, and a spring-clip fixed on the end of the india-rubber tube at C. Now, very nearly fill the bottle with filtered fixing solution (I prefer a saturated solution of hyposulphite of soda for this purpose), insert the bung containing the tubes, and the arrangement is finished. The A tube (the end of which enters the bottle about one inch) is used to make the syphon formed by the B and E tubes act, and, as a vent-hole, the small cork (D) being put into it when travelling. By this means, none of the solution is lost, no matter how much it is shaken.

The diagram shows the bottle and tubes ready for use. The apparatus



is used thus. Nearly fill the bottle with the filtered fixing solution, and insert the bung containing the tubes; then put the end of the A tube in your mouth, and blow as hard as possible, at the same time pinching the clip, so as to open the end of the E tube, and in a second or two the solution will flow; now leave go of the clip, and stop blowing. The syphon will now act without further attention until all the solution the bottle contains is used, provided the end of the A tube is left open, and the B tube touches the bottom of the bottle, and the spring clip is kept below the surface of the solution in the bottle, the amount of pressure applied to the clip regulating the speed with which the bottle will be emptied.

The foregoing method of making a syphon act was described by Mr. T. A. Bridge in the YEAR-BOOK for 1873, page 118. If the above be used in the dark-room, place it on a shelf any height you like above the sink, as far away from the negative bath as possible. By putting it over the sink, should it fall down, it must fall into the sink, thus doing no harm. When used in a tent, the bottle is best enclosed in a box (holes being made in it for the tubes), which is hung up just above the sink for convenience when using, and for reasons before mentioned. Its exact position will, however, much depend upon the other fillings. The best place is given above.

Let care be taken when filling the bottle, and putting it in working order (which should be always done over the sink), and none of the solution will be spilt anywhere but in the sink, so that nothing need be spoiled by it.

If a piece of glass tube (after being drawn to a point of the required degree of fineness) is fixed to the end of the india-rubber tubing, a stream of any degree of fineness can be obtained. Or india-rubber tubing of smaller diameter could be employed instead of that generally used for gas, that is, if spring clips could be obtained small enough to suit it. I do not find it at all difficult to regulate the fineness of the stream by the degree of pressure applied to the clip.

When the above arrangement is used carefully, the solution need never (or at least, very rarely) touch the hands, even if no plate-holder is used, as the quantity poured upon the plate can be regulated to a nicety. The contrivance is better than any I know of when working in a tent, as it is portable, clean, and convenient.

For dark room use, however, a dipping bath (kept in the sink) for fixing is to be preferred to any other plan. While the negative las taken is fixing, another plate can be coated and put into the negative bath, which will be sensitizing while the *fixed* negative is being washed, thus saving time, which is important when one pair of hands has to do everything. Of course a dipping bath for fixing could be used in a tent, if it had a water-tight top, but want of space may prevent it. If a spring clip is not at hand, a small tap can be used instead. In such a case it will be found convenient to fix it to a wooden support, just over or in the sink.

A dish is used for fixing negatives, and by many photographers; but the dipping bath or the above arrangement is much better, as the solution keeps clean much longer. I use a syphon arranged as above r my tent water-bottle (an ordinary tin can), and it answers well.

Instead of the above contrivance, a gutta-percha or glass bottle, having a tap inserted near the bottom could be used, the cork of the bottle being provided with a vent-hole, a cork or peg being used to stop it up with when travelling. The A tube can be kept straight if preferred.

AN EFFICIENT SUBSITUTE FOR OPAL GLASS.

BY WALTER B. WOODBURY.

IN the course of some experiments made during the early part of the present year, I noticed that, by adding a certain proportion of white shellac varnish to a thickish collodion, although the solution remained perfectly transparent, that it became opalescenton drying, and that if a glass plate coated with the mixture were placed in water directly the collodion had set, and allowed to remain until all greasiness had disappeared. and then dried, the result was an intensely pure white coating, which I have never seen equalled by any compound of gelatine and white pigment or other materials of a similar nature.

I need hardly mention the various uses of such a solution, as easily applied as ordinary collodion, than which nothing is easier to coat evenly a large surface. For a backing to all descriptions of transparent pictures, for developing carbon prints on, instead of opal glass, &c., one-quarter lac varnish to three-quarters collodion I have found to answer best, but it is easy to arrive at the most suitable proportions.

Since writing the above I have been informed that such a mixture has been previously suggested in the journals, but I have not seen it, and can hardly understand that it has not, in consequence, come

largely into use. Possibly the extraordinary addition to the opalescence caused by placing the plates when coated directly into water was not mentioned, otherwise this easy and simple method of getting a pure white opalescent surface would have been largely in use. I enclose an example to the Editor.

CONSTRUCTION OF TEMPORARY DARK-ROOMS.

BY COSMO I. BURTON.

There is no doubt that since the adoption of gelatine plates this subject has become of very much less importance than in the days when a plate had to be developed within an hour after coming out of the silver bath. But at the same time that temporary dark-rooms have become less essential, they have become very much more difficult to construct, in consequence of the fact that now it is necessary to have the room dark except for light of the proper colour, whereas in the days of collodion it really did not much matter. But I am speaking of the days of collodion as if these were entirely past, and I do not know whether it may be considered as a blessing or the reverse that this is not so. I am not here going to enter into a discussion of the comparative merits of collodion and gelatine, as I think most photographers must be, like myself, heartily sick of the subject by this time; but I am going to give a few plain practical hints to those who may wish to make a dark-room for temporary purposes. Firstly, I suppose hardly anybody who has worked collodion does not know that it is perfectly safe to develop with a naked candle or small gas flame, of course keeping the plate at some distance from the light. A knowledge of this very simple fact saves an immense deal of trouble. Then daylight does not need to be very strictly excluded—light from under a door or the like will not generally do any harm; but I would say to collodion workers, beware of *red* light. I once covered an ordinary small window with one thickness of very well coloured ruby paper, and though the light was not very bright, it gave dense fog on a collodion plate in a few seconds, even at fully three feet from the window. A great boon to a collodion worker, whatever his dark-room may be like, is an opaque bath with a cover.

A developing room for gelatine is a more difficult problem, because in this case, as I said before, it is really necessary to shut out white light; anyone who has tried must know how wonderfully difficult it is to do this. Here we begin to perceive the immense use of a material which it seems to me has not yet been duly appreciated, namely, brown paper. It appears to me that it would be nearly impossible without this valuable material to convert an ordinary into a dark-room within any reasonable time. I have myself made an excellent door by pasting two thicknesses of thick packing-paper on a light wooden frame; this door keeps out light as well or better than one of solid wood, was very cheap, and quickly made. In making dark rooms on other people's premises, brown paper may

(best when the owner is not looking) be tacked—or, still better, pasted—over the window or other apertures, and a strip at the bottom of the door, and all round if needful. If the window is at all a bright one, the paper must be double. But it is advisable that one window or a part thereof be covered with ruby paper two or more thicknesses according to the light outside, and the sensitiveness of the plates used; or a method which is often more convenient and quite as safe, is to take the plates out of their boxes and place them in the dark slides in absolute darkness. With a little practice it is easy to know by feel which is the right side of the plate. When it is to be developed, light the gas and turn it down as low as possible, then put the plate in the bath and pour on the developer, after which a little gas-light will do no harm, and it is much easier to see by white light how the development is proceeding.

I once made a very convenient little dark-room for merely changing plates of the space between two doors leading into a room; the space certainly was not more than three feet by one and a-half, but it did very well for small plates; the light in this case was a candle inside a ruby chimney, the latter supported on two match boxes. This is an excellent arrangement, especially when the candle burns down and sets fire to the match boxes, as it did once in my case, when I turned up just in time to prevent a general conflagration. Since then I have used empty match boxes when I used them at all.

A great and very obvious rule, when working in badly-constructed dark rooms, is to let the plate be exposed to what light there may be for as short a time as possible; and here, I think, appears a disadvantage of double backs: it always takes some time to fill a double back, during which time one or both of the plates is unavoidably exposed to light. However, this is but a small disadvantage to set against the many and great advantages of these excellent contrivances.

STRAY THOUGHTS ON PHOTOGRAPHIC EXHIBITIONS.

BY THE REV. F. F. STATHAM, M.A., F.G.S.

No one who has considered attentively the growth of pictorial art in this country can fail to associate its progress very materially with the institution and gradual extension of the school of the Royal Academy and its annual exhibitions. Taking its rise in the humble association of a few professional enthusiasts, it soon began to assume such encouraging proportions as to enlist the favour of the wealthy and aristocratic, by whose influence it ultimately secured the invaluable aid of the Royal patronage, and found its diplomas of merit sought after and prized by the whole community of painters and sculptors, and its annual exhibitions of their choicest works looked forward to as among the most cherished intellectual treats of each recurring fashionable season.

Now, if we examine carefully into the remote causes of this success, we shall find that they are not far to be sought. The mere circum-

stance of bringing together each year the best efforts of the most experienced and devoted students of any particular art must have a salutary effect upon those who practise it. Then, again, the eye of the public is gradually tutored to recognize what triumphs in pourtraying the beauties of nature are possible, and so by degrees a system of patronage is established. A justifiable ambition to be found among the successful competitors for the suffrage of public favour is thus aroused, and, even among the most noble spirits, means and opportunities of comparison of their productions with those of other workers in the same field are welcomed; while to the younger and less experienced of the artistic brotherhood, the careful examination of the works of their elders is sure to be productive of thought, and suggestive of energy, and may doubtless lead in time to successful imitation, even if not to superior excellence.

And there can be little doubt, I think, that the annual exhibitions of our great London Photographic Society—albeit not as yet dignified by the title Royal—followed, as they have been, successfully, by similar exhibitions in our larger provincial towns, have in like manner done very much good in familiarizing the public mind with the remarkable triumphs which photography has already attained, both in an artistic and scientific point of view, and in stimulating to renewed efforts the energies of its votaries, both amateur and professional. Had it not been for these exhibitions, indeed, many even of the well-educated ranks would have remained to this day unaware of the extended applications of photographic skill, and would have been content to regard the camera—as but too many even at present do—as a mere machine for securing cartes-de-visite more or less life-like, or more or less artistically diversified by ingenious backgrounds or decorative framing.

It is true that there are, and have been for some years past, a few shops in every large town where some of the masterpieces of landscape figure or architectural photography, both of home and foreign production, are on sale; but these specimens of the art are, as a rule, too delicate and valuable to be soiled by constant fingering or by frequent exposure to the dust or gas fumes of the shop window, and they are consequently stored away in drawers or portfolios, and are practically almost lost to the eye of the general public.

On every ground, then, both of expediency and of public instruction, it is most desirable that the annual exhibitions of our great national society, and, by parity of reasoning, of our larger provincial societies, should be made popular and thoroughly successful. With this object in view, it would be well that the sources of success in the older exhibitions should be carefully considered, and, if practicable, the same paths to prosperity and usefulness be followed out. One of the prime elements of success that suggests itself in connection with the Royal Academy exhibition is that from the first it has steadily enlarged its means of accommodation by increasing its wall space according to the yearly growing number of its exhibitors. Indeed, it may be affirmed of any artistic competition that the first and most

essential conditions of success must be ample space for fair examination of the exhibits, adequate lighting and ventilation, and, if the exhibition be during the winter months, a moderately comfortable temperature. And, with regard to wall space, it is to be borne in mind that the conditions as respect photographs and paintings are not altogether similar, so that a greater breadth of "purview" (to use one of Mr. Gladstone's favourite expressions) immediately in front of the spectator is required in the one case than in the other. To say nothing of the larger size of paintings generally than of photographs, a brightly painted landscape or sea view, or a bold architectural interior, or stretch of moorland, will bear looking at from a considerable distance—nay, sometimes requires that the spectator should recede a few paces in order that he may attain the right point of view; whereas a photograph of the same subject, in order that its beauty may be properly appreciated, would most probably require a careful close inspection. In other words, "skying" and "flooring," which may answer very well for tolerably large paintings, or even for architectural or portrait photographs on a grand scale, ought carefully to be avoided with the moderately sized exhibits which constitute the bulk of our photographic shows. It was absolutely piteous to see many persons kneeling or crouching painfully on the floor to examine some of the admirable contributions to the Pall Mall Gallery this season, or to hear the wail of disappointment at the inability of the spectator to "crane" his neck so far back as to attain a comfortable view of a tempting landscape placed some feet above his head, although no possible blame can be attached to the Hanging Committee, simply because the space at their disposal was so lamentably small in comparison with the large number of excellent photographs sent in for exhibition. It may, however, be a fair question for discussion, with the excellent Chairman and able Committee of the Society, whether a room of larger dimensions could not be obtained for future exhibitions, or, if this be found impracticable, whether some regulations as to the limitation of the number of exhibits from the same individuals would not secure a more equable distribution of space among the increasingly large number of artists who are desirous of bringing the products of their skill before the public.

Another item which has had much to do with the success of the older exhibitions has been the knowledge of the fact that a successful picture or piece of statuary at the annual exhibition would most probably meet with a purchaser, and would thus add to the resources as well as increase the fame of its fortunate possessor. Is there any real obstacle to the introduction of a similar practice with regard to our photographic exhibitions? If, as is the case with the Royal Academy, a book were provided containing the prices at which copies, if not the originals themselves, of any favourite photograph could be procured, would it not be likely to act as an incentive to many of our first-rate artists, who now seem almost to have forgotten that there is an annual exhibition, or who, resting upon their laurels already won, deem that they have now no further interest in the contest, and therefore no longer enter the "lists"?

Has not also the period of the year at which our London Photographic Exhibition is open some connection, more or less remote, with its prosperity? The height of the season might, it is true, find many other attractive collections competing for public favour, but while crowds of fashionable people are thronging our streets, and daily passing the doors of a photographic display fully worthy of inspection, is it but reasonable to suppose that a much larger number might be induced to enter and satisfy their curiosity than are to be met with during the dull and generally foggy days of November, when the weather renders even those who may be in town more prone to stay indoors than wander out for the purposes of amusement or sight-seeing? I cannot but think also that the whole question of assigning medals of honour as rewards for excellence is one requiring careful reconsideration. It is to be borne in mind that the honorary distinctions earned by the practitioners of the nobler arts patronized by the Royal Academy have not been awarded for one special or solitary proof of manual or intellectual ability, but to a recognised and well-earned reputation for repeated exercises of the imitative genius. Whereas, upon our plan, with every effort on the part of the judges to be impartial, it cannot but sometimes happen that, in selecting what they may have considered the most meritorious production of the year, they have not necessarily selected the best that photographic art could produce, but merely the best which meets the eye on the walls of that particular exhibition. And, further than this, with our newly-introduced dry-plate system, it becomes more and more difficult to ascertain in what proportion any merit duly recognized ought to be shared between the manufacturer of the dry plates used, the heads of the firm exhibiting, the actual operator and developer, or the individual—perhaps the real author of the success—who has devised the plan and suggested the whole mode of treatment adopted. I am afraid the sense of some anomaly here has begotten occasional feelings of disappointment which have disinclined competitors from risking the laurels they have already gained, under former processes, where all depended upon their own skill and judgment, and robbed our later exhibitions of contributions from some of our best known operators.

A CAMERA TO CARRY AND EXPOSE ONE HUNDRED FILMS.

BY ALFRED PUMPHREY.

The introduction of gelatine films during the past year has done something to lighten the labour of landscape photography; how much, and how little, I propose in as few words as possible to describe.

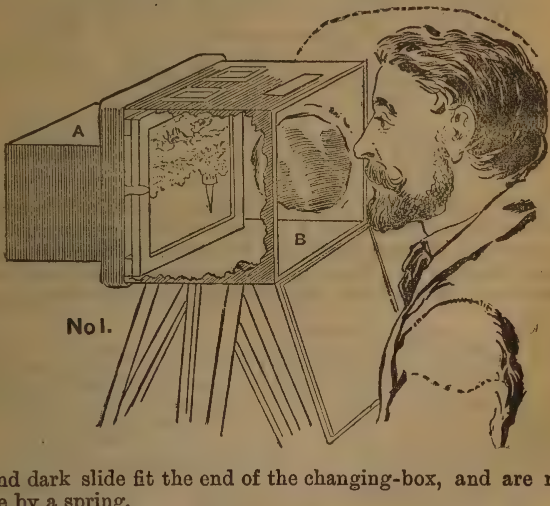
To give my own experience, I was working the size $8\frac{1}{2}$ by $6\frac{1}{2}$ on collodion, and determined to give gelatine a fair trial, and films in particular. I adopted some well-made double dark slides which weighed twelve ounces each for the films, and starting with camera and six double slides, my pack weighed ten pounds. If I had

carried glass it would have weighed fourteen and a half pounds, so that using films in carrying a dozen plates reduces weight nearly one-third.

One or two days' work showed me I was getting less done than with collodion, as to secure certainty I found it it was desirable to give more than one exposure on any subject I thought important.

I calculated that to meet my requirements I must carry at least eighteen dark slides, and that was out of the question without a conveyance of some kind or another, in consequence of bulk. I have therefore dispensed with the ordinary dark slides, and carry one only, which weighs nine ounces, and will carry one hundred films or eight to twelve glass plates. The slide and camera are attached to a changing box, and this arrangement I propose to describe by the aid of the following diagrams :—

No. 1. A is the camera opening into a changing box, B; the focusing



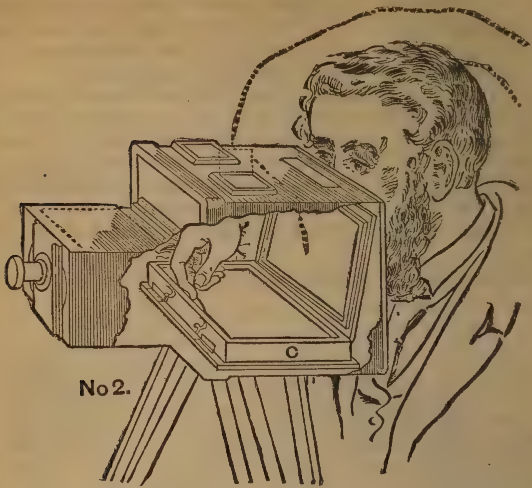
No l.

glass and dark slide fit the end of the changing-box, and are retained in place by a spring.

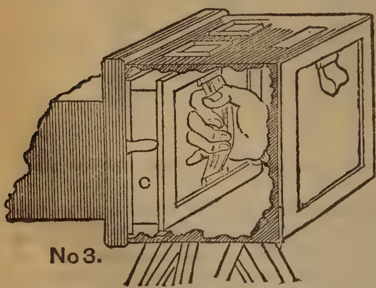
No. 2 and 3. The dark slide is represented by C in each diagram. In No. 2 it is represented open on the front side ; in No. 3 closed, and being placed in focus. It consists of a box $1\frac{1}{8}$in. deep, with a frame half an inch less than the size of the film on one side, and a closed door and handle on the opposite side. It is filled in the following manner : it is placed with the frame downwards, and on the frame is placed a card the same size as the film, with velvet on both sides ; as many films as desired are placed in the box, sensitive side towards the velvet. The box is then filled up with plain paper, till it will only just close.

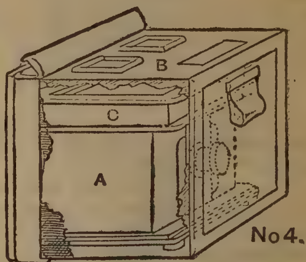
Diagram No. 4 represents the whole apparatus packed. A is the

camera, B the changing-box, C the dark slide; the ground glass is below the camera, thus no room is wasted. Weight 7 lbs.



Method of Manipulating the Camera.—When it is desired to expose a film, the focus is first secured, as in diagram No. 1, by introducing the ground glass, and securing the focus by sliding adjustment shown in the camera (diagram 2); the ground glass is then withdrawn, the lens is capped to exclude the light, and the dark slide introduced into the





changing-box; a dark cloth (indicated by the dotted line in diagrams Nos. 1 and 2) is attached to the camera by thick elastic, and is drawn over the head so as to exclude all light, the operator looking through a slit in the top of the changing-box.

The operator introduces his right hand, and opens the box, lifting up the card, which is covered with velvet, and taking a film from under the card, places it upon the top of the card; the frame is then closed (diagram No. 2), and the dark box pushed up to the extreme end of the changing-box, where it is in focus (diagram No. 3). When the hand is withdrawn, the film cannot be affected by any little light which may enter the changing-box by the sleeves.

After the picture is taken, the hand is inserted, and the dark slide laid flat in the bottom of the changing-box, the film which has been exposed is withdrawn, the box is turned over, and the exposed film put in at the back of the dark slide. All this is easily done with one hand, and it takes less time to do than to describe. The process can be repeated till the paper packing is reached, when it will be evident that all the films are exposed. There is no chance of a mistake being made between the exposed and unexposed films.

The arrangement is the subject of Letters Patent.

A DAY WITH A PORTUGUESE AMATEUR COLLOTYPIST.

BY MAJOR J. WATERHOUSE, B.S.C.

FEW visitors to the Paris Exhibition of 1878 can have failed to notice the very beautiful collection of silver prints and collotypes exhibited in the Portuguese Section by Senhor Carlos Relvas, of Gollega, and his talented daughter, the Senhorita Marguerite Relvas. As the work of amateurs, they were remarkable for their artistic beauty and technical excellence. The collotypes specially interested me, and I am very glad to have the opportunity during a recent visit to Portugal of making the acquaintance of Senhor Relvas, and learning some of the details of the process which he acquired from M. Jacobi, and has since published in M. Vidal's *Phototypie*. The process is also used in the Photographic Section of the Government Topographical Department, where I saw it in operation.

By the kind invitation of Senhor Relvas I visited his country house at Gollega, about sixty miles from Lisbon, on the road to Oporto, on my way to Spain, and in his absence was most hospitably entertained and shown over his very beautifully situated and perfectly appointed studio by his assistant, Senhor Fonsieca. The principal studio stands by itself in a garden with palms and other tropical plants, and is a very pretty and tasteful two-storied building. The ground floor is divided off into workrooms for printing, toning, mounting, &c., while above are a spacious glass room, developing chambers, and some luxuriously furnished reception rooms. Altogether, in its fittings and appointments, it is a most perfect photographic atelier, and makes one rather regret that it should be so hidden away so far in the country. A second smaller studio in connection with the house is the special domain of the Senhorita Relvas, who has made several charming studies of flowers and other genre subjects. It would take too much time to enlarge

further on all I saw at Gollega; I must therefore content myself with giving an outline of Senhor Relvas' collotype process as I saw it worked at Lisbon, and described by M. Vidal.

The support for the gelatine printing surface is plate glass about a quarter of an inch thick, and finely ground on the coated side. The plates, having been thoroughly cleaned with nitric acid, washed, and dried, are levelled carefully in a drying box.

The preliminary coating is composed of

Whites of eight eggs	
Bichromate of potash	8 grammes
Distilled water	400 cub cents.
Glycerine	24 drops
Ammonia	12 drops

It is spread over the plates with a glass rod, run round like collodion, and the excess poured off. The plate is then replaced in its original position on the levelling screws in the drying-box, and left to dry. When the coating is quite dry, the plate is placed, coated side downwards, on a board covered with black cloth, and exposed to light for twenty minutes, or just long enough to leave the coating slightly soluble on the surface. The plate is then put into warm water for about fifteen minutes to remove the bichromate, and dried again in the open air. The plates may now be kept, or coated at once with the second coating, which is composed of

Gelatine (Nelson's No. 2, fine cut) ...	27 grammes
Distilled water	400 cub. cents
Bichromate of potash	9 grammes
Solution A	15 cub. cents
,, B	15 ,,
Ammonia	12 drops

Solutions A and B are composed as follows:—

Solution A

Chloride of sodium	10 grammes
Distilled water	500 cub. cents

Solution B

Sulphate of alumina	1 gramme
Water	100 cub. cents.

The above is spread on the plates in the proportion of eighteen grammes per square foot. After the plates are coated they are put to dry on the levelling screws in the drying-box, and should dry in about half an hour with an even polished surface, and may be left till the following day before use. The exposure to light is about twenty minutes in the shade, in fine clear weather, with a negative of moderate density. After exposure the plate is washed in cold water for about an

hour to remove the bichromate, and then drained and dried. Before printing, the plate is treated with a solution composed of

Glycerine	... 500	cub. cents
Solution C	... 100	,,
Distilled water	... 200	,,

Solution C

Nitrate of magnesia ...	... 50	grammes
Water	... 500	cub. cents.

The object of this is to soften the gelatine surface. It is left on for two hours, then poured off, and the plate well washed and dried. A little linseed oil is then rubbed over the plate, which is again well washed and dried. The back of the plate is carefully cleared of any adhering gelatine or other matter which might cause it to break in the press. The plates are printed in one of Poirier's special presses for collotype printing. The bed carries a lithographic stone on which a flat glass is laid, and embedded in plaster of Paris. The printing plate is fixed in the press by moistening the back of it, and then moving it about on the fixed glass bed till it adheres firmly. Before printing, the gelatine surface is well sponged over, and the superfluous moisture taken off with a pad of calico, or with special rollers made for the purpose, covered with cotton cloth or chamois leather. The first inking is given with a grained leather roller, and a glue roller is then used to equalise the inking and give softness to the half tints. The plate is damped with plain water, or with a mixture of equal parts of glycerine and water. The softening solution given above may be used for the same purpose.

COMPOSITE NEGATIVES.

BY ALEXANDER COWAN.

THE following has been found a simple way of uniting in one negative various effects, which are generally only obtained by double printing.

First take a few negatives of any suitable backgrounds, and from these negatives make positives on gelatine plates by contact printing—on the same sized plates that are used in the camera; then place in the camera, as close to the front of slide as possible, an oval mask of the size required, and put into the slide a gelatine plate, carefully noting that it fits closely into the lower left-hand corner; then proceed to take a negative in the ordinary way. This plate will have, of course, an oval picture with clear margin; when dry, place in contact, face to face, with one of the transparent positives already made, being careful to register them by the same left-hand corner; then to the back of the positive fasten with gum a disc of opaque paper cut from the same mask used in the camera, being careful to register the same in the centre of the oval picture.

Next take a printing-frame a little larger than the plates used, and fasten into it a clear patent plate glass, and on to this fasten a cardboard mask of the thickness of two negative plates, and about half-an-inch

larger each way than the size of the plates used (this is to form a rebate, in which to correctly register the plates by the same corners that were used in the camera); also to the outside of the glass fix a similar mask of convenient size to form a rebate to hold a phosphorescent tablet (such as is used with Warnerke's sensitometer), which is to act as the source of light.

Now proceed to make a negative by placing between the subject and the lens any vignetting arrangement preferred (a very admirable one was described in the YEAR-BOOK for 1866), and focussing so that the picture balances well in the oval opening, not forgetting to see that the plate is placed in the left-hand corner of the slide. After exposure, remove to the dark room, and place the plate in contact with one of the positives, having the oval disc attached, seeing that both exactly register in the left corner of printing-frame as arranged. Now illuminate a phosphorescent tablet with a small piece of magnesium wire, and place in the rebate of frame; expose for the number of seconds required, according to the density of the positive (four or five seconds is generally enough), and proceed to develop in the ordinary way. The resulting negative should have the subject vignetted into a softly-defined oval on a background of whatever character desired. Of course, in practice, if these pictures are required frequently, it will be better to impress a number of plates with the backgrounds first, and keep them in readiness.

The phosphorescent tablet is recommended in preference to any other light, because, being placed so near the plate, and having a larger surface than the oval mask, the rays of light run under in all directions, and tend to soften the outline, and obliterate any slight error in the registration. Gaslight at a distance can be used, but gives a much harder outline, and requires to be very carefully adjusted to the centre of plate.

MEMORANDA ON PHOTOGRAPHIC POISONS.

BY J. VINCENT ELSDEN, B.SC. (LOND.), F.C.S.

NOT only is some fatal case of poisoning heard of every year, but there are doubtless many cases in which illness is produced, and serious risk is incurred, which never reach the knowledge of the outside world. The wide-spread ignorance of the toxicological effects of many photographic chemicals does not tend to diminish the danger of serious accidents. Many instances have come to my own knowledge of a most careless disregard for the most poisonous chemicals, which are often used without any precaution, left standing within anyone's reach in bottles either unlabelled or bearing no signs of warning, and used by everyone in such a way that immunity from accidents can only be looked upon as providential.

I have thought, therefore, that a few notes on some of the more common photographic poisons would be of use, in order that photographers, during the coming year, might be able to act promptly in any possible cases of emergency.

Class	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Vegetable Acids.	OXALIC ACID, including POTASSIUM OXALATE	1 drachm is the smallest fatal dose known.	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting, or magnesia suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	AMMONIA POTASH SODA	Vapour of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	MERCURIC CHLORIDE	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	ACETATE OF LEAD	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	CYANIDE OF POTASSIUM	*a.* Taken internally, 3 grs. fatal. *b.* Applied to wounds and abrasures of the skin.	Insensibility, slow gasping respiration, dilated pupils, and spasmodic closure of the jaws. Smarting sensation.	No certain remedy: cold affusion over the head and neck most efficacious. Sulphate of iron should be applied immediately.
	BICHROMATE OF POTASSIUM	*a.* Taken internally. *b.* Applied to slight abrasions of the skin.	Irritant pain in stomach, and vomiting. Produces troublesome sores and ulcers.	Emetics and magnesia, or chalk.
	NITRATE OF SILVER		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	NITRIC ACID HYDROCHLORIC ACID SULPHURIC ACID	2 drachms have been fatal. Inhalation of the fumes has also been fatal. ½ ounce has caused death. 1 drachm has been fatal.	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	ACETIC ACID, concentrated, has as powerful an effect as the mineral acids.			
	IODINE	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot, and starch given freely.
	ETHER	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.

HOW TO MAKE A GELATINE EMULSION GIVE UNIFORMITY IN SENSITIVENESS.

BY A. J. JARMAN.

It might almost be thought that the subject of gelatine emulsion making was well nigh exhausted; yet there are occasional enquiries about the means of producing a gelatine bromide emulsion that shall give uniformity in sensitiveness from day to day. I will venture to give the formula that shall fulfil the above desire, presuming that the reader is acquainted with the making, washing, and filtering of gelatine emulsion.

Take 300 grains of picked (*i.e.* white) gum-arabic, grind it a little, and place it in an 8-pint wide-mouthed stoneware jar; also 860 grains of pure bromide of ammonium, and 600 grains of Nelson's transparent sheet gelatine, with 40 ounces of distilled water. Take 1,200 grains of crystallized nitrate of silver, and place it in another stoneware jar, with 30 ounces of distilled water. Put both the jars into a vessel with water heated to 140° Fah.; stir each solution well with separate clean glass rods or strips, and when the contents of each are equally heated to 140° Fah., the silver solution may be poured in a gentle stream into the bromized gelatine gum solution by the aid of a ruby-orange light. When all has been mixed and thoroughly stirred, cover the top of the jar with a clean tin cap, and allow the temperature to be kept up to 140° Fah. for eight hours, occasionally stirring the emulsion during that time, which may be done in the dark, no light being needed for this operation. At the end of this time there should be weighed out 1,000 grains of Henderson's soft gelatine, and 600 grains of either Coignet's gold label (recent make), or Carl Simeon's *hard* gelatine; this 1,600 grains of gelatine must now be added to the emulsion, and occasionally stirred until all of it is thoroughly dissolved and incorporated with the emulsion, which will take about a quarter of an hour. It is then poured out into a clean 12 by 10 deep porcelain pan to set, and should be allowed to set for forty-eight hours; it may now be wrung through a piece of Berlin wool canvas (that kind known by the name of Leviathan white canvas is the best), and allowed to fall into a solution composed as follows:—

Common salt	½ pound
Water	1 gallon

Let it remain in this for five minutes, then strain through a horsehair sieve, and wash it well for an hour and a-half; allow the shreddy emulsion to drain well in the sieve for about a quarter of an hour; at the end of this time place it in a clean stoneware jar to melt, with the addition of 4 drachms of a saturated solution of nitrate of potash upon melting, which may be done in water at the temperature of about 120° Fah. It will be found on measurement to be nearly 100 ounces of emulsion. As soon as it is melted and ready for filtering, 4 ounces of methylated spirit may be mixed with it, to which have been added

4 drachms of an alcoholic solution of tannic acid, made by mixing 10 grains of tannic acid with 1 ounce of alcohol. This is to prevent frilling. The use of the salt water employed for the first washing appears to ward off any tendency to green fog, and clear out a tendency to grey fog. In fact, it seems to act similarly to a solution of bichromate of potash, without interfering with the sensitiveness of the silver bromide.

If the above instructions are followed out in every detail, I do not think that any complaint will be made about uniformity of sensitiveness.

The rapidity of the plates will be about eight times that of a wet collodion plate, which, for all ordinary purposes, is as rapid as could be desired, a fair amount of ruby-orange light being admitted during development.

A PHOTOGRAPHIC VADE-MECUM.

BY M. LEON VIDAL,

Editor of the "Moniteur de la Photographie."

THE portability of photographic apparatus is one of the most important questions of the day, more especially now that we use in a dry state so many highly sensitive substances, which can be kept for any length of time without loss of sensitiveness, and can be developed no matter how long after exposure. To comply with the condition of portability, the apparatus must in the first place be as small as possible, both in size and weight; the photographic vade-mecum which I have in view should be as portable as the pencil-case that we carry in the pocket or hang at the watch chain. Of course, however small the instrument may be, it must still be larger than a pencil case of the most exaggerated dimensions, but we all have in our pockets objects of considerable size—such as knives, cigarette machines, cigar cases, &c.—and it seems to me quite possible to invent a pocket camera a size quite comparable with any one of these. What I would suggest could be something like a single-barrel opera glass, fitted with a small self-focussing lens in place of the eye-piece, and, instead of the ordinary object glass, with a grooved frame for the sensitive plate. In order to be able to focus, the mount of the lens should be capable of sliding within the tube of the instrument, and of moving between two points separated by an interval of about three or four centimetres. In front of the lens there should be a double system of stops with circular apertures, situated eccentrically with reference to the axis of the instrument, and also an instantaneous shutter set in motion by a sufficiently strong spring. These should be arranged so as to regulate within certain limits the amount of light admitted, and the length of the exposure to a minimum of about one-fiftieth of a second. By the stops the intensity of the light could be made to vary while the time is constant, and by altering the tension of the spring the time of exposure could be made more or less short.

Up to this point there is no difficulty either in devising or executing the instrument on the lines indicated, and for this reason I have already set to work to realise my ideas; but where the question becomes complicated is in the attempt to transform the small negative of about 4 by 4 centimetres taken in the instrument, into a print not necessarily of very large size, but at least four times as large as the one taken directly in the camera. If we are compelled, after developing, to proceed by the ordinary enlarging process with a projection apparatus, the work is very intricate for an amateur; in fact, it constitutes so great a difficulty that any one who is not a photographer by profession, and has not the necessary time at his disposal for so delicate and complicated an operation, will probably throw up the undertaking altogether.

But is there no means of circumventing this enlarging process by projection, and of arriving by a direct method, so to speak, at the production of images larger than the little plates taken in our pocket camera? A method of this kind has, in fact, been discovered, and was published some months ago; I have myself had an opportunity of trying it on an occasion not long ago, when I was compelled to work with sensitive films which did not adhere well to the glass. Instead of sacrificing the negative, I allowed the film to separate altogether, and thus became possessed of a floating pellicle much larger in size than the plate (13 by 18 centimetres) on which it had been taken, for when fixed and well washed, it could be stretched on another plate, 18 by 24 centimetres, and adhered to it perfectly.

Repeating this experiment four times consecutively, I always produced the same successful results, and obtained negatives nearly double the size of the original plates. It was conducted with tolerably thin films, but it is evident that films of double the thickness would be capable of being enlarged to a much greater extent. This, then, is the direction in which I intended to pursue my investigations on a point of the greatest importance in the question of portable photographic apparatus. If by this means we can succeed in obtaining, instead of a plate of 4 by 4 linear centimetres, or of 16 square centimetres of surface, one of 8 by 8 linear centimetres, or of 64 square centimetres of surface—that is to say, one of four times the surface of the original—we shall have an image of quite sufficient size for reproducing impressions and records of an excursion without resorting to any further enlargement.

Films of the necessary thickness can be readily prepared; they should have as support crystal glass plates coated with stearine, on which, placed in a perfectly horizontal position, sufficient gelatine solution can be poured to form, after desiccation, a film of about a millimetre in thickness. When this plate has been exposed in the pocket camera, it must be kept thoroughly protected from the light, and then laid in the developing solution; here the film will not only be developed, but will also stretch in every direction, until it is more than double—up to quadruple—its original size. As the object is to obtain a pellicle of at the most

sixty-four square centimetre surface—that is to say, one not in any case exceeding in size what is commonly called a quarter-plate—the manipulation of the process above described ought to present no difficulty. Before completing the washing of the films, they may be passed through a solution of alum to make them tougher and more resistant. My own experience is that this method of enlargement is not in any way a difficult one, but that it offers the best solution of the problem how to use the pocket camera; this handy little instrument will, therefore, be placed within the reach of everyone, and another incentive will be offered to the extension of photography.

PHOTOGRAPHY IN THE HIGH ALPS.

BY W. F. DONKIN, A.C.

THIS subject, I am sorry to think, is not one that is likely to be of practical interest to many photographers, so I will be brief.

In the summer of 1877, I took a 5 by 4 camera to Switzerland, with six dozen Kennett's plates, and chemicals, &c., for developing, and the experience gained among the lower hills, and then over two or three of the easier snow passes, showed that there is no real difficulty in mountain photography, and that where you can go a camera of moderate size can go too. I went again in 1879, 1880, and 1881, taking a 7½ by 5 camera, and Wratten and Wainwright's ordinary plates. Each year I have made small improvements in my apparatus, adapting it for the special purpose of taking panoramic views from high points. Such panoramas are frequently of value for topographical purposes, and may sometimes be pictorial in character as well. A single photograph, however, taken with an ordinary camera and a wide-angle lens, cannot include more than a quarter of the entire horizon at most, and the result would be very unsatisfactory. But by taking two or more pictures with a lens of longer focus, they may, with certain precautions, be fitted together to form a long panorama. To do this satisfactorily, several points must be attended to: First, the head of the tripod stand must be carefully levelled, so that the camera may revolve horizontally; secondly, the lens should be lowered considerably below the centre of the camera. It is evident that if a view be taken from a mountain-top with the camera horizontal and the lens opposite the centre of the plate, barely half the plate will represent anything but sky.

My camera does not admit of lowering the lens enough, so I am obliged to tilt it; and in order to do this, and also to allow it to revolve horizontally, I interpose between the camera and the tripod head an independent square base-board which can revolve horizontally, and to the front edge of which the camera is hinged. The back of the camera may then be propped up at any required angle by a brass support fixed by a thumb-screw. The swing-back must then be set at the same angle so as to bring it vertical again, and the camera is now ready and may be revolved horizontally through the entire circle, although

tilted downwards. This arrangement, however, is complicated and somewhat ricketty, and it would be much better in all respects to have the camera front so made as to allow of lowering the lens an inch-and-a-half.

Any portion of the view is now focussed and taken, and the camera revolved so as to take the next portion. The views should overlap on the plates at least half-an-inch, and to secure uniformity in this, vertical pencil lines are ruled on the focussing glass half-an-inch from each side. Before turning the camera round for the second view the focussing glass is turned down again, and some definite point in the view which is crossed by one of the lines is noted. The camera is then revolved until the same point falls on the other line, and the second view is then taken. The same process may be repeated until the complete panorama all round the horizon is taken. This would require eight plates, using an 8-inch lens and a $7\frac{1}{2}$ by 5 plate (practically $6\frac{1}{2}$ by 5), but I have never taken more than six.

In levelling the stand, it saves much time to have three levelling-screws in the tripod-head; the base-board rests on the three screws, and is clamped by the central screw. The swing-back must also be exactly square with the axis of the lens as regards the side swing, or the image of the same object on the edges of two contiguous plates will be of different sizes. They will also be slightly distorted in opposite directions if a single view lens be used, so I generally employ an 8-inch Ross' portable symmetrical for these panoramas, though for single views I prefer, of course, a meniscus lens, generally Dallmeyer's 7-inch. I carry also a 5-inch portable symmetrical and an 11-inch Dallmeyer's rapid rectilinear. The camera (one of Rouch's patent), the lenses, changing box,* twelve plates, and slide, pack into a solid leather knapsack measuring about 16 by 12 by 4 inches, which weighs when packed about eighteen pounds. The tripod stand straps on the top of the knapsack, and adds three pounds to the weight. This I always carry myself on all except the most arduous expeditions, when I divide the apparatus between myself and the porter in two smaller packages. But I value independence in these matters very highly, and I do not find my knapsack too heavy to carry up moderate mountains of 10,000 or 11,000 feet, such as the Oberrothhorn near Zermatt, on the top of which I spent three hours alone with my camera on a gorgeous day last August. The knapsack should be fitted with broad straps, and so arranged as to be slung comfortably and securely on the back, leaving the arms quite free for the use of the ice-axe. This is the only way in which a weight of over twenty pounds can be carried securely and without fatigue.

The Rev. Mr. Palmer describes the ill-fate of his large camera in the clumsy hands of his porter; but I think it can hardly have been packed

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* If a changing box is used, the plates should always be filled in *through the slide*; then you know they won't stick. I sometimes use double backs, but in my experience there is little to choose between the systems as regards convenience.

so as to be really portable. A knapsack cannot fall off the back unless the straps break.

It is of great advantage to have a sliding tripod stand for uneven ground. I have used Kennett's smallest size for four years, and have seen no better form of stand. It should be fitted with "snow-shoes" for soft snow; three bits of sheet brass about 3 inches square, with a hole in the middle for the leg to pass through, and a brass pin through a hole in the leg, 4 or 5 inches from the end, to prevent the plate sliding up. The pin is tied to one corner of the plate by a short piece of boot-lace. (N.B., very useful things, porpoise-hide boot-laces.)

As regards exposure, it diminishes as the elevation increases; thus on the Dom (14,940 feet) one second was enough for Wratten and Wainwright's ordinary plates, with intensity $\frac{f}{45}$, while two seconds were none too much at a point half-way up the mountain. I have always used alkaline pyrogallic for development, and this I keep for off days or bad weather. I clear the wash-stand or table in my bedroom, cover it with brown paper, hang up the jug on a peg, and put a syphon in it, and arrange the basin, dropping-bottles, and dishes. Then I light the lamp, close the shutters, and pin up a shawl or rug over the whole window with large drawing-pins.

For packing apparatus for travelling, a basket is superior to any kind of box, being light, strong, and elastic. I have tried various methods of packing dry plates, and I believe Captain Abney's to be the best. A number of rectangular frames are made, exactly the size of the plates, by gluing together at the corners narrow strips of cardboard. One of these is interposed between a pair of plates put face to face.

In one respect, photography on the top of a mountain is simpler than anywhere else: no time is spent in looking for a suitable point of view. The view is there (provided the clouds are not), and you must take your chance as to whether it is pictorial or not. That from the Matterhorn, for instance, is neither pictorial nor very interesting—at least, so I persuaded myself on arriving at the top in a gale of wind, having left the camera some way below. From the Dom, however, the view northwards is superb, the near, middle, and far distances being well represented. That from the Weisshorn (14,800 ft.), towards the south and west, overlooks a vast sea of mountains and glaciers, rocky ridges and wide snow-fields, which make a rather confused picture.

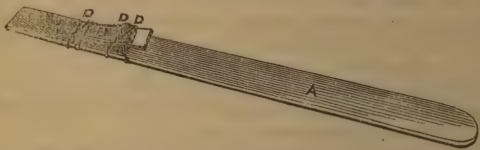
The top of the Weisshorn (one of the highest and most difficult mountains in the Zermatt district) is a sharp three-sided pyramid of snow, and on arriving there one brilliant morning, after a severe seven hours' climb from the hut half-way up the mountain, we had to cut the top off to make standing room. There was a cold northerly breeze blowing, and it was no easy matter to keep my wits about me so as to make no mistakes while arranging the camera and taking two views, the focussing cloth flapping wildly in the wind, and the guide holding the tripod steady with one hand, and the rope round my waist with the other, as I crept cautiously round behind the camera. In such places it is

advisable not to discard the rope. In case of a slip, one would probably spend the remainder of one's life sliding down a snow-slope, and that occupation would not last long enough to become at all monotonous.

RECOVERY OF PLATES WHICH HAVE SLIPPED FROM THE DIPPER.

BY EDWARD HILL.

TAKE a strip of glass (A) the length of the bath, and roughen the surface on the lower end. Next cut a smaller strip (say) three or four inches long (B), which must also be roughened; after which procure a small cork, and cut it through the middle, from end to end. Take one of the halves, and cover it, or soak it in a solution of shellac, and place



it on the long slip, A. Next adjust strip B on the top, and bind them together by crossing an india-rubber ring, and passing it round the cork and strips of glass, and finish by placing another ring nearer the end at D. Now you can recover the plate by passing the apparatus down the bath, and, moving the lost plate forward, slip the strip behind it, and, by bringing the end B against the front of the bath with a little pressure, the bottom of the clip will be opened, and secure the plate.

SUBSTITUTE FOR THE BACKING OF GELATINE PLATES.

BY JOHN HARMER.

ALTHOUGH many of the present samples of commercial dry plates may be used for studio and ordinary cases of out-door photography without being backed, yet there are many circumstances—as when photographing strongly-contrasted and brilliantly-lighted subjects, as well as the majority of interiors—where it becomes advisable, if not absolutely necessary, to do so.

The best of the usual methods of backing being but a messy operation, the thought occurred to me that some substitute for it of cushion form could be made, slightly larger than the usual sizes of plates, to suit the camera-back, with which it could be used as required, instead of the usual partition-plate of metal found in most modern double backs. As it is necessary to secure optical contact between the glass and its backing, India-rubber appeared to be the most likely material to supply this *desideratum*, and when put to the test proved to be so.

The application of this substance to the purpose consists in making up two thin and smooth-surfaced layers of the red vulcanized kind into an air-tight cushion, provided with a small nipple of flat tube at one corner for supplying air, after which it may be closed by tying. A cushion of this description, when expanded sufficiently to suit the slide with which it is to be used, would bulge most in the centre, and would be pressed into intimate contact with the back of each plate in a double slide when placed on the back of that in one half, and the other one closed upon it. Smoothness of surface, as near a polish as possible, combined with the yielding nature of the rubber under the slight pressure, renders the contact complete—in fact, quite optical—and the adiactinic quality of thin sheets of this particular colour entirely prevents the transmission of light.

HINTS IN REGARD TO TAKING PHOTOGRAPHS WITH THE LENS JUST OFF THE SUN.

BY W. D. VALENTINE.

THE Editor has kindly relieved me of the difficulty of choosing a suitable subject for a few notes to the YEAR-BOOK by suggesting the above.

The class of pictures most suitable for lighting with the sun just off, or in face of the lens, are sea pieces, cloud effects, and studies of single trees. With moderately sensitive gelatine plates, better results can, perhaps, now be obtained than with the wet collodion process. The latter certainly had the advantage that a greater amount of detail could be manipulated into the heavy shadows in the course of intensification; on the other hand, by using gelatine plates and a drop shutter for securing cloud effects and sea pieces, one may count on getting almost entirely rid of the evils of halation. It is only by a very happy combination of circumstances that a subject can be secured with proper lighting and suitable clouds, so that in most cases resource must be had to combination printing. In no way, perhaps, in photography can the effect of glowing sunshine be produced better than by working with the lens just "off" the sun; but with the accompanying difficulty of too heavy shadows, you secure the high-lights and detail in half-lights all right, but they must be manipulated in the printing. One very simple way to do this is either to grind the back of the plates with emery and water, using a glass cube (a chandelier drop answers well), or covering it with mineral paper, toning down the shadows by rubbing over them either medium powdered blacklead or colour; should any of the high-lights be too glaring, exposing the back of the print for a few minutes to diffused light will do much to soften them. We rarely see now-a-days photographs with white paper for skies; but, on the other hand, how few are seen in which the printed-in clouds are lighted as the picture! A few stock cloud negatives are bought or produced, and used for all and sundry—a

grave mistake, it being imperative to use a cloud plate taken at same angle as picture.

In photographing trees, let us suppose a Scotch fir or gnarled oak without foliage, the main body of the tree in shade, with the sun just edging the outline of trunk and branches, and its heavy shadow falling across the foreground. A day with clouds, when an exposure of two or three seconds can be given with sun, and a few with diffused light, is infinitely preferable to a full exposure with sunlight. The effect of "sunlight" is then produced with an accompanying amount of detail in the shadows unobtainable in any other way. It is impossible in a case like this to produce cloud effects in the one operation, so that the harmony of the finished picture will much depend on the selection and use of a suitably lighted cloud negative.

An effect seldom rendered in photography is that of cloud shadow and sunshine on hills. Supposing a picture of this description to be taken, the only way to secure a suitable sky would be to expose another plate immediately after for it alone.

In the class of pictures I have referred to, though half the battle has to be fought in the printing, a great deal can be done toward overcoming the difficulty of heavy shadows by over-exposing, and subsequently stopping the development; with wet collodion, by smartly washing off the developer after intensification; and in gelatine bromide plates, by the judicious use of bromide of potassium. Though as yet in its infancy, gelatine bromide has undoubtedly placed a new power in the landscape photographer's hands. With trustworthy plates he can now concentrate all his energies on the selection of, and waiting for, effects, unoppressed by the bugbears of stains, drying marks, &c., with the serene consciousness that the development can be conducted in his well-appointed chemical room at leisure.

HOW TO PRODUCE GELATINE NEGATIVES HAVING THE QUALITIES OF WET PLATES.

BY HERBERT B. BERKELEY.

The alkaline pyrogallol developer is generally acknowledged to be the one most easily adapted to the circumstances of exposure and the varying qualities of plates of all the chemical developers which have hitherto been used for bromide of silver films; while its well-known properties of staining the gelatine film and of causing the whole surface to assume a dingy ochre tint utterly destroying brilliancy of the shadows, and rendering it extremely difficult to correctly estimate the printing density of the image, is justly considered a fault hardly atoned for by the many other advantages it offers. On the other hand, developers composed of ferrous salts, while causing no staining of the films, and giving images of a very suitable colour, have obtained but few ardent supporters—at least, in this country, the home of dry plate work, and of chemical development.

The writer for a long time past has considered the staining of gelatine films by alkaline pyrogallol to be altogether unnecessary, and in a minor degree also this peculiar character of image to which he has referred. Soft and decomposed gelatines are certainly more subject to discolouration of various kinds than are hard gelatines; and with the latter and a well-restrained developer of the ordinary kind much may be done to avoid them. But still the developer in this form is not exactly perfect, and it soon becomes discoloured itself, even though it may not very appreciably stain the film.

It may be remembered that in the last YEAR-BOOK the writer gave an account of his method (which he knows to be approved of by some, at least) of obtaining images free from the usual defects of "pyrogallic stains" and the all-pervading sickly yellow tint, and, instead of these, clean glassy shadows, or very nearly so, and images of a warm black tint.

During the past year a further experience with this form of developer has added to the good opinion then entertained of it; and the writer has been led to make the following alterations in the method of using it, by which further advantages are obtained.

Instead of adding sulphite of soda to the water used for making the developer, a solution of this salt in water is made containing forty per cent. The "neutral" sodic sulphite will be found, on testing, to be alkaline, and it should be neutralised, or nearly so, with citric acid. When complete solution has taken place, some of the contents of the bottle are poured upon dry pyrogallic acid equal to ten per cent. of the entire bulk of solution to be made, and then returned to the bottle.

The formula then stands thus :—

Neutral sodic sulphite	40 parts
Citric acid	*quant. suff.*
Pyrogallic acid	10 parts
Water ... ... to make up	100 ,,

Every ten minims of this solution contains one grain of pyrogallic acid. The keeping properties of the solution (which may, with advantage, be decanted into well-corked phials containing a few ounces each) are very great—much more so than is the case when citric acid has been used alone. Moreover—and this is its most important property—the pyrogallol, when made alkaline by the usual addition of ammonia and water, does not materially discolour through oxidation, even during a prolonged development of from ten minutes to half-an-hour, or more. Citric acid, on the other hand, while affording a very fair preservative of the pyrogallol in the acid state, fails to sufficiently retard oxidation when alkalinity prevails, and when the citrate of ammonium only is present. It will, therefore, be easily understood that when the sulphite is used in the manner explained, discolouration of the film is scarcely likely to occur; and with hard gelatines this seems next to impossible.

The images obtained with plates containing, perhaps, one-twelfth

part of silver iodide are of a warm black colour, and the shadows are not to be distinguished from the glass on which the film rests, and this without the use of alum at any part of the operations. A short soaking in alum is, however, to be recommended for hardening the film and destroying any traces of hyposulphite after the plate has received a thorough washing.

The use of ten per cent. solutions of ammonia and of bromide, for convenience of estimation and of comparison of results, is also highly to be recommended.

A minor advantage of this developer is that by its use the staining of the hands is almost entirely avoided; but for several reasons it is better not to dabble in the solutions, but to use a hook made by heating thick whalebone, and then bending it, the upper part of the shorter limb being pared away so as to form a wedge.

HAPPY (?) MEDIUMS.

BY WILLIAM SHAWCROSS.

With your permission, Mr. Editor, I will give you a few of the "mediums" in use for retouching, my excuse for troubling you being that so many of the younger members of the "Black Art" are unacquainted with the mediums that can be used.

Should it be desired that the retouching be done upon the varnish, there are several modes of getting a "bite" for the pencil.

Rubbing the varnish carefully with powdered pumice-stone, cuttle-fish powder, or powdered resin. The following mixture is also good. Dissolve with gentle heat some resin in spirits of turpentine until it is of the consistency of thick oil, put a small portion of the above on the varnish, and rub briskly with a soft rag over the parts to be worked upon. Retouching varnish also answers well, its only fault being that it gets tacky in printing.

The above are most suitable for "wet" plates. For "dry" plates, I recommend that the retouching be done *before* varnishing. Some gelatine films will take the pencil without any medium; but, as a rule, sufficient work cannot be applied in that way.

I find the following to work very well. Spirit of turpentine four drachms; gum-dammar, six grains: apply a little with the end of the finger, and rub until almost dry. The negative can then be worked upon to any extent, and afterwards varnished in the usual way.

Any of the above can be used on the varnish, but I recommend, if this be done, that after the retouching is done the negative should be made very warm. If sufficient heat be applied, the medium and retouching will sink into the varnish, and therefore cannot be rubbed away in printing. The best plan, however, is to do all the work before varnishing, and then use a hard varnish, and your negative is safe.

THE WET PROCESS.

BY J. THOMSON, F.R.G.S.

We stood upon the apex of the Cyprian Olympus, "Mount Troodos," about five thousand feet above the level of the Mediterranean. A heavy storm had been brewing, and burst upon our camp. A dark cloud, like a sponge full of water, enveloped the mountain, and, under pressure, discharged its contents at brief intervals.

We pitched our dark tent upon a knoll, for every hollow was transformed into a pool, and as the thunder peeled and lightning flashed, our photographic prospects and our position were in peril. Our party consisted of the chief of Prodromos, a village sportsman, Habib Kuri, dragoman, three muleteers, and three mules. We ascended the mountain to photograph a shrine of "Aphrodite," together with a panorama of Cyprus. The shrine, if it ever existed, had been demolished, and the landscape was blotted out.

Water for the wet process had been transported to the summit, for the plains were parched with more than tropical heat; but on this summit I had my wettest experience in any process; water everywhere! No heat, no sun, no shrine, no landscape. Nothing for it but to wait the advent of light, and landscapes fit for photography.

The chief crouched beneath the tripod in a shower-bath of tent-drippings. Habib stood the brunt of the storm, wrapped in meditation and his bed linen. His wide Turkish bags were tied fast at the ankles, and soon filled with water, so that he stood in a double aquarium, and had to be tapped before he could untie the ligatures. After waiting an hour or two, there came a lull and gleam of light. All hands turned to, baled out the tent, and secured a negative. As we made the descent, darkness set in anew, and we stumbled downward through chaos, our feet falling on shifting masses, or sinking into mire. Torrents thundered through ravines, streams swept down every chasm and furrow of the rocks. Pathways there were none, and pines looming large through the mist mislead the mountaineers, who trusted for guidance to the belts of forest on the way. Our troubles at last came to an end, as we emerged from a stream about three feet deep flowing down the village road, and landed at Prodromos.

The villagers were anxiously awaiting our return, nor would they leave us to repose until, with their own eyes, they had seen us change our raiment. Their warm hospitality reassured us, for we felt as if it were the day of doom. They watched us with kindly curiosity until we were clothed, and evidently in our right mind. Later on, we photographed the chief and one or two of his friends, and made some observations for temperature and elevation.

Habib, who had neither scrip, nor staff, nor change of raiment, was fain to wrap himself in a sort of winding sheet, and dry his clothes at an extemporised fire. At last he retired to rest on a deal table, and awoke refreshed for the morning journey.

Leaving Prodromos at daylight, we made the descent towards Paphos.

It fell out, by the way, that a certain muleteer had stolen a strap of English manufacture, and as he strode his mule he carried an uneasy conscience. He was a handy man, and cunning with his fingers, and had to unpack and set up my instruments. Morning rose over the mountains in prismatic hues. A light breeze lifted the mist in wreaths from the valleys, where it lay, level as a lake, with rocky inlets dotting its expanse.

Descending an elevated spur, we came upon a scene of surpassing beauty. An old rocky foreground, with muleteers at rest in the shade of pine trees—a group typical of the picturesque bodies and leisure-loving souls of the Cyprians: a dreamy mid-distance of pine-clad peaks, veiled with thin wreaths of mist, beyond, a dim vista of crags, and overhead a heavy sky driven with the wind, which was rising. I secured an excellent negative of this scene, reared it up in the tent to dry, and, coveting the repose of the Oriental mind, lit a cigarette, and sat down to enjoy the scene. The wind whispered pleasantly among the pines, wafting their perfumes abroad; but suddenly there came a calm followed by a savage blast that laid my tent and camera low.

The erring muleteer came in for the lion's share of my nitrate bath. His eyes smarted viciously, and it stung his conscience, for he confessed the theft of the strap, and begged that the fates might save him. We bathed him with water, and treated him with cyanide, but without effect, for he felt persuaded that the stains came out on his body to atone for the sin of his soul. While his conscience lightened, his face darkened, until he developed into a positive picture on his way to Paphos, spotted like the leopard; nor could he change his spots for many days. The lifting of straps and buckles became most inconvenient; they were doubtless useful to muleteers in an island some hundred of years behind the times.

AN EFFECTIVE METHOD OF ENLARGEMENT.

BY VALENTINE BLANCHARD.

A FEW years ago I read a paper describing a method of enlargement I had found very efficient. I employed paper negatives, and the prints made from them to illustrate my paper caused considerable surprise at the Photographic Society's meeting, for it had not been generally considered possible to obtain prints so free from texture from waxed paper negatives. Several eminent photographers adopted this method of enlargement, but a great many experienced difficulty in the waxing process. The great facility offered by dry plates for working this method of enlargement induces me to offer a modification of this process to the attention of photographers.

A copying camera will be necessary. Those photographers who have a large camera can easily convert it into a copying one, either by placing a bellows camera in front of the large one, and fixing the negative in the dark slide, of course pulling up the slide, and placing a piece of white cardboard at an angle of 45° behind the negative, so as to send

an even stream of light through the negative; or, perhaps, better still, to fit up the camera as follows. Get a flat board of about five feet long, and the exact width of the large camera. Now make a wood grooved frame exactly the size of the front of the camera; keep this parallel with the front by two pieces of wood screwed to the sides of the frame, but lower than the base, so as to slide along the side of the board. Now nail on to the sides and top of frame some black twilled cloth, letting it drop down on each side of the base-board. Inner frames of various sizes may be easily made of very thin board, such as is usually employed for the backs of picture-frames, and drawing-pins will readily hold the negative in position. The black cloth should be pulled over the large camera, and with very little trouble the light can be excluded. This will be found much more convenient than the old-fashioned copying camera, for when not in use it can be cleared away without taking up much room.

Now place negative in position, and make a transparency the size of the picture desired. Develop the transparency until every detail possible is produced, and get as much force as would be necessary for a negative; *this is most important.* The transparency may be made on a dry or wet plate, according to the taste of the operator; but there should be perfect gradation from the highest light to the deepest shadow. When the transparency is dry, and varnished, place it in the dark slide, film side upward. Now take a dry plate, and place carefully in contact, taking care not to rub the surfaces together, and to avoid dust. Extend the camera as much as possible, and take a long-focus portrait lens, and remove the front lens, the object being to send a stream of uniform light through the camera; place a piece of cardboard at an angle of 45°. Before putting in the dark slide, look through the focussing glass; if the whole screen is evenly illuminated up to the extreme corners, all is well for the next operation, viz., the exposure. This can only be determined by experiment, but two or three seconds will usually be sufficient. Now develop in the ordinary way, but at the commencement employ very little ammonia and bromide, as the great object is to secure every gradation contained in the original negative; do not be satisfied with anything short of the mark. A capital negative can be made by those who work the carbon process by printing from the transparency on carbon tissue, and developing on glass. It will be necessary, however, in making the transparency, to turn the film side of the negative outwards, or the image would otherwise be inverted.

Many, if not all, of the beautiful enlargements of animals by Mr. Dixon are done by this method. A little reflection will show that by this mode of enlargement one series of defects almost disappear. Any spots in the small negative are, of course, magnified in the transparency; but as we see the true relation of light and shade, it is so much easier to work upon it, and with a little patience a great deal may be done with advantage. Now, in making the negative, either by carbon or dry plate, there is no further magnifying of defects, and a marked difference is, in consequence, visible between the results by this method and those pro-

duced by the old mode of enlargement. When once a good transparency has been produced, any number of negatives may be made from it without any difficulty to meet any sudden demand for a large number of copies. Any one trying this method of enlargement will never go back to the old way of working.

EXHIBITION MEDALS AND AWARDS.

BY W. S. BIRD.

THE utility of offering medals for competition at the Annual Exhibition of the Photographic Society can scarcely be questioned. No man is averse to the recognition of a special excellence in himself. Excellence is comparative, and where many pursue the same endeavour, rival claims to distinction appeal for judgment. Competent tribunals may award the palm of merit, and a medal is eminently convenient; it becomes the symbol of an achievement, and confers distinction on its possessor; it is often of commercial value, and little consideration is required to see that mankind is stimulated with symbols of this kind. The influences of decorations on the military spirit in all ages is patent; the Victoria Cross to-day is a potent force, a talisman, and a sign of glory.

The industrial age is to succeed the militant, and in the peaceful rivalry of commerce, science, and art, men will strive to secure such visible recognition of eminence as is conferred by medals. In the opinion of the writer, the success of the exhibitions is augumented by the fact that medals are to be won.

The utility of medals conceded, small heed need be given to the plaints of unsuccessful competitors. A society with medals to award is compelled to the practical step of appointing a committee of experts to adjudicate. Men of knowledge and repute, occupying a position free from the suspicions of favouritism, are essential. When such an experienced committee does its work conscientiously, its decisions will fail to please everybody; it may now and again pass over work that appears to many of conspicuous merit, but the verdicts will mark the leading excellences of the year, promoting thereby public appreciation of fine work, while guiding and stimulating the efforts of future exhibitors.

With the Photographic Society of Great Britain, the last few years has witnessed a new departure in the composition of the jury of awards. This has taken the form of associating artists of Academic renown with the photographic complement of judges—an association greatly to be commended; it gives a more dignified status to the art side of photography, and brings the aid of specially cultivated taste to decisions of the committee. It cannot fail to prove beneficial, and to increase the influence of the Society.

Nevertheless, there are indications that the influence of gentlemen entitled to write R.A. or A.R.A. after their names is at present paramount in adjudication. The judges whose special knowledge entitles

them to estimate at proper value technical skill, novelty of appliance, improvements in method, may be supposed (to judge by the awards) to fulfil the position with extreme modesty, and to treat with too sufficient deference the opinions of artists.

Concurrent with the desirable introduction of eminent artists into the jury, a change hss been made in the system of distributing the awards. It may even be correct to say system has been abandoned, and that the jury enters the field with half a score of medals to give to pictures that please them best. This mightily facilitates their work, it is clear, but does it promote the advance of photography as a whole? Is it the best method to enhance the usefulness and prestige of the Society?

Questions of this sort are being asked, and it may be desirable for the Council of the Society to discuss such in conclave, and to revert to a classification of photographic work, in order to help on its varions divisions with the stimulus honours afford. Considering the wide field of photographic energy, it is scarcely credible that a year's medals can be wisely awarded if eight-ninths go to delightful bits of landscape seized with skill and good fortune by the instantaneous process. This should not be possible. Portraiture is the most important field of photographic work—the most socially influential, the most open to improvements by increase of artistic feeling, easily capable of classification for prizes, and should have its prescribed contests to deserve them. Collodion and gelatine results in similar work might compete for a prize; the various permanent processes should be encouraged in friendly rivalry; mechanical and scientific improvements in practice should not be left out in the cold.

In short, system is necessary. It is agreed that medals are useful. Our art-science has many branches; its industrial applications are numerous, its possibilities inexhaustible, its art aspect progressive. The fostering Society of Great Britain should again classify its departments, note their shortcomings, and arrange its disposition of medals so as to encourage every effort to increase the usefulness and beauty of production, and to point with set purpose the endeavour of intelligent workers in the field.

APPARATUS FOR MIXING AND WASHING EMULSION.

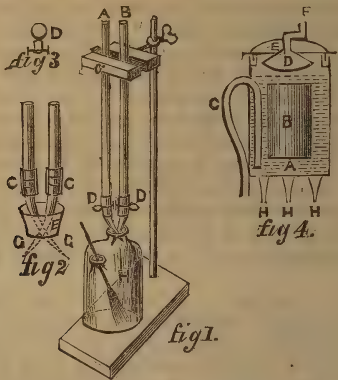
BY PETER TONG.

In a demonstration I gave of the preparation of gelatine emulsion, at the March meeting of the Bolton Photographic Society, I exhibited and described the following apparatus for the mixing and washing of emulsion.

I think the cause of the irregularity in the sensitiveness and general character of different batches of gelatine emulsions (made from the same formula) may to a great extent be attributed to variations in the mixing of the bromide and silver with the gelatine, such as the speed of mixing, and the relative excess, as the mixing proceeds, of the bromide to silver.

In this mixing apparatus, the rate at which the salts are added is always constant, as well as the proportion of one to the other, and as the salts are added to the gelatine in about their combining proportions, the silver bromide is in a very fine state of division.

A and B (fig. 1), are two burettes, each of which is made of a long piçce of glass tube of half or three-quarters of an inch bore (which is better drawn out smaller at one end), to which is fitted a piece of rubber tubing marked C in the diagram; to the other end of this rubber tube, a short piece of glass tubing of $\frac{1}{4}$ inch bore, drawn out to a fine point or jet (marked G in fig. 2.), is attached, leaving half an inch or more between the two glass tubes, to allow a pinchcock, D (fig. 3), to pinch the rubber tube, and prevent the solution flowing out except wheu re-



leased. The two small tubes, G G, are passed through a cork, E, crossing each other, as shown in fig. 2, so that the solutions may flow into the Woulffe's bottle, H (which has two necks), in two distinct thin streams.

One of the tubes, G, may have a slightly larger opening than the other, allowing the bromide to flow out quicker than the silver nitrate, thus preventing any possibility of there being an excess of nitrate of silver, which might combine with the gelatine and produce fog.

In using the apparatus, pour the previously warmed solution of gelatine into the Woulffe's bottle, H, the bromide, also warmed, into one of the tubes, A and B (that connected with the tube, G, having the largest outlet), and the warmed silver nitrate solution into the other; release both the pinchcocks, D, with the left hand, and twist the long-haired brush, F, round between the finger and thumb of the right hand, at the same time moving it rapidly up and down, which will thoroughly whisk up the gelatine solution whilst the silver and bromide are added.

The rest of the diagram will be readily understood, being simply an arrangement for holding the tubes, &c.

Washing Apparatus (fig. 4).—A is a tin can (mine is ten inches deep, and six inches diameter) with a light-tight lid, E (the figure shows how the light is trapped) ; D is a rose, made of block tin to prevent corrosion, soldered to a lead pipe, F, passing through the lid, E, and connected with the water supply (the holes in the rose should be very small). B is a cylinder open at both ends, with a rim on each end, on which to fasten a piece of muslin. This cylinder has a flange outside in the centre of its length, which rests on three small brackets soldered in the inside of the can, A. The whole of the tin, with the exception of the rose, must have several coats of Brunswick Black.

To use, tie a piece of muslin on one end of B, and put in the set emulsion (cut into squares of half an inch or less, or after being squeezed through course canvas into water, as in Wratten and Wainwright's method), cover the other end with muslin, and tie with string. Place the cylinder into the can, A, put on the lid, E, and turn on the water ; when it reaches the bend of the lead syphon, C, the syphon commences to empty the water from A, which is again filled and emptied as before (it thus fills and empties itself automatically). The bore of the syphon must be at least twice that of the inlet, F, which should not be more than $\frac{1}{4}$-inch, or even less would be better. H H H are three feet on which the can stands. After the lid, E, is put on, the washing may be done in open daylight.

BLUNDERS.

BY WILLIAM BROOKS.

It is an old saying that blunders—or, as some people call them, mistakes—will occur in the best of regulated families, and I find that photographers (both amateur and professional) are not exceptions to the rule. I remember once, some eighteen years ago, when residing in Cornwall, an old photographer come rushing in to my house, saying that he had his studio full of people, and he could not take a single picture, and would I come and get him out of his difficulty. He said all went right, apparently, until he applied the developer to the plate, and there came the rub, for as soon as the developer touched the plate, it immediately turned perfectly black, and so dense that you could not see through it. I at once went round to his place, and found it just as he had described, and at once guessed the cause. He blamed the bath, as photographers generally do ; I blamed the collodion, as in the course of experiments I have seen the like before. I told him I thought the collodion was contaminated with pyrogallic acid. He said at once he was sure it was not. But I still stuck to my own opinion. Guessing the cause, I had put a small bottle of collodion in my pocket. He coated a plate with the sample I brought, and he obtained a good nega-

tive without any further trouble. I stayed with him until he had got rid of all his sitters. I then questioned him. He still said he was sure there was no pyrogallic in the collodion. But after a little while I asked him what he iodized his collodion in. He produced a four-ounce measure, which appeared perfectly clean, and after a time he said that he remembered a certain measure he was accustomed to use to make up his developer got out of its proper place, and he had used the one he had just shown me. I wanted to know why he put pyrogallic into the measure—why not put it in the bottle direct, and put the water on it? He said the formula said one drachm of pyrogallic to so much water. So the fact was, he had actually been measuring the pyrogallic (dry) in the fluid measure, and that was all the cause of his difficulty. I told him I thought that was dry measure with a vengeance! It is a pity there was not a school-board when he went to school.

I remember another blunder, of a different kind, that occurred a few years ago. I had been giving instructions to the party, and it is a well-known fact that most amateurs will try to run before they can walk. It was in the time of collodio-bromide emulsion that the party in question had been advised to purchase some plates of a well-known firm in the City, and these plates had been backed with burnt sienna and a little gum; he had tried to develop them himself, but not a ghost of an image could he get. After keeping the solutions on the said plate over an hour, the rest of the plates were taken to the maker for him to develop. He tried a few, with no better result, and at last the remainder were brought on to me; but before I attempted, I questioned the party whether he had pulled up the shutter or taken off the cap. The reply was, "Oh yes! I am positive of that." I then put the question—"Which side of the plates did you expose?" The answer was: "Oh! the red side!" I at once burst out laughing. The poor plate-maker had been told that his plates were no good, as he himself could not get an image, and if he could not, who ought to be able? Of course I did not try, but explained matters. Some time after, the same party had, he told me, only one plate in his dark slide, and set his camera up in a dell with not a very good light. He guessed the proper exposure would be about ten minutes, and to go to his house to get a fresh supply of plates would take twenty minutes; so to make up the time he pulled out the shutter *half-way*, and gave twenty minutes instead of ten to make up for it, and he could not understand why there was no image on half of the plate.

Another blunder that I have seen several times. The plates have been put in the changing-box the wrong way about, and the back of the plate (this time without backing) has been exposed instead of the front.

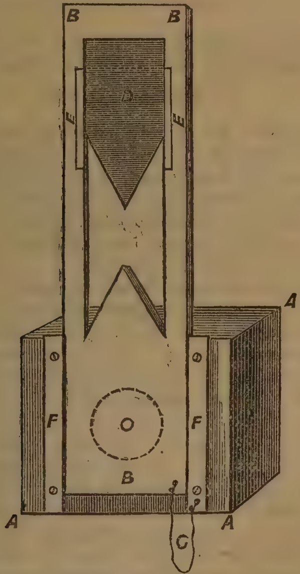
Another blunder is, plates are often changed with only a piece of yellow paper round the candle at an hotel, and it is well known, with gelatine plates, this will never do. The result is, the makers of the plates receive the most uncourteous letters, abusing their plates. Of course the parties themselves are never in the wrong! Oh, dear no!

They then try all the plates that are in the market, with no better results. My advice is to amateurs, and also to professionals, who have not had much experience in dry plates, *before you blame the maker* of the plates, try and find out what you have done wrong, and I am sure, in nine cases out of ten, the fault is with the user, and not with the plates.

A SIMPLE AND EFFICIENT DROP-SHUTTER.

BY J. C. HANNYNGTON.

The subjoined sketch is, I hope, sufficiently clear to save the necessity of elaborate description.



AAAA, Square box, on which are screwed battens at FF.
BBB, Shutter sliding freely in the battens FF.
C, A string fastened to pegs in F and B, whereby the drop of shutter is checked.
D, A slide of black card sliding tightly in the battens EE.
O, Aperture in box.
The drop-shutter BBB may be made of any convenient length.

The shutter itself is fitted on to a small square box, which may be attached to the camera front. As, however, the fall of the shutter may cause shake, in practice I fasten the square box to a stand, pass a light-

tight endless bag over the box and the lens, and fix the box so that the aperture is close to and directly opposite the lens. The drop-shutter BBB consists of two parts, the portion D being movable. It is self-evident that by pushing the movable portion D, the aperture of the shutter can be increased or diminished, and the exposure regulated, for a larger aperture will take longer to pass by the hole O through which the image reaches the lens. By attaching an elastic band to the drop-shutter and to the bottom of the box, an exceedingly rapid exposure can be secured.

The shape of the opening in the drop-shutter is intended to give a longer exposure to the edges and corners of the plate, the central rays being most rapidly cut off.

EFFECTS OF HYPOSULPHITE IN CONTACT WITH CHLORIDE OF SILVER PRINTS.

BY LYDDELL SAWYER.

While men are toilfully but surely cutting their way through the frowning boulders that strew the heights of photographic science, they might well sometimes look back, and, kindly smiling on the youthful toilers who still swarm disconsolate round its base, point out to them the early windings of the weed-over-crowded paths; then—but I hear an editorial whisper, soft as a zephyr, and plaintive as an æolian lyre: "Brief and practical!" Ahem! Thanks.

It is not an unknown occurrence for silver prints, when the toning and fixing operations are completed, to show symptoms of a semi-metallic sheen on the surface, having with it a yellow discolouration sufficient to render the affected proofs worthless. We, in our place, became sufficiently acquainted with this trouble to make its removal very desirable.

It was instinctively felt that contamination with hyposulphite of soda in the earlier stages was the cause, yet it was only after considerable testing that the actual source was definitely traced. The presence of the hyposulphite in the chloride of gold toning showed no immediate change, as might be expected from the sel d'or bath experience; nor was there anything positively noticeable through similarly contaminating the last washing waters used previous to toning; but the smallest trace of hyposulphite of soda in the first, or even the second washing water, manifested the evil very powerfully in the finished print.

From this demonstration it was concluded, and the same opinion continues to be entertained, that the soda salt combines with the free nitrate, liberated most profusely in the first waters; then it affects the prints in some active sulphurous form of silver, which is only made manifest when in minute quantities, after fixation.

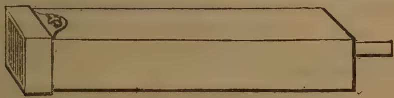
On the strength of this conviction, the cleanliness of the preparatory washing vessels for prints has since received careful attention, and the complaint has never recurred.

AN EMULSION CUTTER.

BY W. BEDFORD.

It has been found, when gelatine emulsion is washed in the form it assumes when squeezed through canvas or wire gauze, that it is apt to take up more water in the process of washing than is required, and the finished emulsion is in consequence too thin. This contrivance has been devised for cutting the emulsion into a more convenient shape for the subsequent operations of washing, draining, and, if necessary, drying.

It consists of a metal tube of oblong section, silver plated inside, terminating at one end in a short piece of pipe. At the other end is a removable cap, with a series of steel blades fixed like a grating at regular



distances of an eighth of an inch apart. The emulsion having been prepared with the full quantity of gelatine, the cap is removed, and the warm emulsion poured in; a flat piece of ebonite, cut to fit inside, having first been dropped into the tube to serve as a piston, and the union pipe plugged up. After the emulsion is thoroughly set, which may be hastened by immersing the tube in cold water, the cap, with its blades, is securely fixed in position, and allowed to dip below the surface of the water in the washing apparatus, while the plug having been removed from the union at the other end, which is now uppermost, connection is made with the water supply by means of a piece of high pressure india-rubber tubing. If the available force of water be sufficient, on turning the tap the piston descends, and the emulsion, forced between the blades, issues in the shape of long ribbons, which are readily washed, drained, and collected, either to be re-melted, or, if preferred, they may be hung up on a silver wire in the drying closet to form dried pellicle. If the pressure of water be insufficient for the purpose, other means must be adopted for expelling the emulsion, but the hydraulic arrangement, where practicable, is much more convenient.

THE TRUTH ABOUT GHOSTS!

BY CLIFTON CLIFF.

No, my friends, I am not going to start the *Telegraph* discussion afresh; neither am I going into the *pros* and *cons* of spirit photography. I merely wrote the above heading because I thought I would be sure to "fetch you with a ghost, ghost, ghost!" The ghosts to which my title refers are those dreadfully misty portraits which a good many people still turn out, and which are the only results that they can obtain (so they say)

with dry plates. I imagine that I was one of the first to use the instantaneous process, and at the commencement I could get nothing but ghosts. The main question was, and is now, what is the truth about these ghosts? Is it the fault of any special make of plate, or is it the fault of the manipulation? My answer is, that it is most certainly the latter. I have tried nearly every brand of plate in the market, and find that I can obtain good bright portraits on any of them; or I can, if I like it, produce ghosts. A great many people have been crying out for a good intensifier, and one gentleman advertises to intensify our negatives by a "secret process." If a plate is properly exposed and properly developed, it never wants intensifying at all; but as accidents will happen on the best regulated railroads, so now and then there will be a plate lacking density; when that is the case—and I contend it should be very rare—then we have a really good intensifier in Mr. Swan's formula. I refer to the mercury and ammonia, which I have never known to fail in bringing up the most obstinate ghost.

One great cause of ghosts is, strange as it may sound, not having light enough in the developing room. We are so terribly frightened of getting too much that in nine rooms out of every ten, we have a great deal too little. Unless there is light enough to see clearly, and to be able to watch the negative develop accurately, ghosts *will* appear. More light, my friends! that is the first thing we want.

The second cause is *under*-development. I have been in a good many studios, and seen a good many operators develop dry plates, and in nearly every case they have taken the plate out and put it in the hyposulphite considerably quicker than they should have done. If the negative is left in only till the shadows begin to cloud, it is generally considered developed; and in one sense so it is, for it appears full of detail, but nearly always lacks brilliancy. If the cliché is left developing until the whole surface appears black, and no image can be seen, and then plunged immediately into the soda, there will be a vast difference in the result; the shadows, when fixed, will be just as clear as in the other case, but the whole picture will be brighter, and at the same time softer. By this it will be seen that I skip the usual washing between the developing and fixing. I do this for the reason that it saves valuable time, and gives equally good results. Another cause of misty images is to be found in the blind adherence to the formulas sent out with the plates. It should be remembered that manufacturers are not always consumers, and that therefore they are not infallible. In many cases, too, stock solutions are made up by mere guess work, which is always a reprehensible practice. In every studio there are weights and measures, and I opine they are mostly there for use. The best developer in my hands is the following:—I make up a stock solution consisting of 3 ounces of strongest liquid ammonia ·880, 6 ounces of water, and 40 grains of bromide of ammonium. This I keep in a stoppered bottle. My pyrogallic acid I keep dry. When I am about to develop a plate, I take a porcelain dish containing just enough water to cover the plate, and add to that my pyrogallic, which dissolves immediately. I lay the plate in

that, while into the developing glass I measure ten drops of the stock solution, pour the pyrogallic off the plate into the glass, and the whole back again into the dish, which I then stand down, and watch the image develop. If the picture should be over-exposed, I take it out of the developer directly I see that such is the case, and wash it under the tap, add more pyrogallic and more water to the developer, and put it in again to finish. This always prevents weakness.

When the negative is fixed, I wash it thoroughly, and we all know that hyposulphite requires thorough washing to eliminate it. When it is washed enough, I put it for a few seconds in another porcelain dish containing the following solution :—

Hydrochloric acid	1 ounce
Water	4 ounces
Alum	½ ounce

This takes out every atom of the objectionable yellow colour, and leaves the plate so that it requires a very good eye indeed to tell it is not a wet one.

By-the-bye, I am told that this dodge is being put forward as a new method of intensification. Surely the person bringing it forward labours under a mistake as to the meaning of that long word. The acid does *not* intensify, and it does *not* weaken ; it merely changes the colour, and the acid treated cliché gives an equally bright print as the one not so treated in half the time, which is a great consideration at this time of the year.

If those gentlemen who have been troubled with ghosts will kindly try my method all through, I think I can prophecy the ghosts will be laid, and, with Mr. Burnand, they will be able to say " dead for a Duckett dead." If the gentlemen who are *not* troubled with ghosts will kindly try my acid formula, I think they, too, will say " thank you " for the hint. I most sincerely trust that their total extinction will soon be " the truth about ghosts ! "

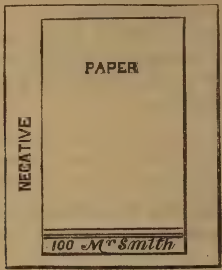
A SIMPLE METHOD OF NAMING AND NUMBERING PORTRAIT NEGATIVES.

BY HENRY COOPER.

WHATEVER method is adopted of storing negatives, much valuable time is often spent in looking up " repeat " orders, as they are called And frequently, when a negative is found, there is some uncertainty respecting the name, &c., which by a little system might easily be avoided.

An excellent method of naming and numbering negatives has been in daily practice in my printing room for the past five years. When the negatives are finished by the retoucher, and ready for the printing frame, a quarter sheet of albumenized paper is cut into narrow strips a quarter of an inch wide, and as long as the width of a carte print.

Both for the sake of convenience and economy, all carte paper is cut to the proper size before printing. The negative is put in the printing frame. A carte paper is taken in the right hand, and properly adjusted on the negative; one of the narrow strips of albumenized paper is then moistened, and carefully adjusted on the varnished film along the bottom of the paper thus:—



The number of negative, and also the name, are then carefully written on this little "guide" or label, and the printer can at once adjust all succeeding papers to the guide, with the assurance that all the prints of the order will be exactly alike.

In reality, the system is much more simple and convenient than any description can make it to appear.

When the order is printed, the name and number are legible on the little white label, so that it can readily be put away, and as easily found if wanted.

TWO NEW STYLES OF FEMALE PORTRAITS—A HINT AND A SUGGESTION.

BY AN OLD HAND.

HALF-A-CENTURY back, or more, before wet or dry plates were in requisition, and a good business done in what was termed the "profile line," a revival of Shakespeare's "Winter Tale" took place at Drury Lane, supported by the popularity of the elder Kean, G. Wallack, Booth, Cooper, Munden, &c., &c.; and a very elegant lady in the character of *Perdita*—Miss Somerville. The great attraction of this revival was the statue scene at the close of the piece, when "Perdita," in appropriate costume, is represented to Leontes as a "Grecian statue." The effect was most beautiful and complete, securing for the piece a very long and prosperous run.

The effect might, at the present, be turned to account by photographers on the look-out for novelty, and if they were to go in for the "new Perdita, full length," they might find it become popular, and pay. If they get a copy of "Cumberland's edition of the Winter's Tale,'

price sixpence, they will find an effectively-engraved figure of Miss Somerville in the character named; and they will also see that many ladies of good figure, &c., would look remarkably well taken in the same way, with the same kind of prepared and wired-out costume, Grecian pedestal, dark alcoved background, &c., &c.

Another portrait for ladies (the " Juliet, from the picture by Sir T. Lawrence), of Miss Kemble in the garden scene, sitting at the balcony, would also be likely to take; so that a hint and suggestion for two novelties (the " Perdita " and the " Juliet ") are here given, and any so inclined can try their skill at the same, as they may each be so treated as to become *popular* and *paying.*

MAKING ENLARGEMENTS.

BY W. T. WILKINSON.

Making photographic enlargements may be classed under two heads, viz., that involving the production of an enlarged negative from a transparent positive (which may be in carbon, in gelatine bromide of silver, or in collodion printed by contact or made in the camera), and that by which the enlargement is produced direct in the camera from the original negative.

The first method is the most universal, and offers the highest advantages in getting the best results, as in each successive stage some improvement can be made upon the original, whereas the second method is limited entirely by the quality of the original; nevertheless, in a photographic business, each class of enlargement has its uses, and the object of the present paper is to describe the various methods under each head that have at different times been advocated.

Under the first head we will take the almost universal plan in which a carbon transparency is made from the original negative by contact for use in the camera for the production of the enlarged negative.

Before making the transparency, the quality of original negative must be considered, so that the proper class of carbon tissue is used. If of good ordinary quality, the special transparency tissue will be the best; but if thin and flat or hard, then a very thin tissue will be the best—in the case of a thin negative the requisite strength and contrast being obtained by intensification; in that of a hard negative, by using a thin tissue the shadows will not be too opaque before the half-tones are printed, as would be the case were ordinary transparency tissue used.

The best method of making transparencies is to squeegee the sensitized tissue upon washed collodionized glass which has previously been polished with powdered talc. Do not use too much pressure upon the squeegee, else more of the sensitizing solution will be removed than is advisable. Place the plates upon a rack to dry in a darkened room, with a good current of dry pure air circulating. When dry, insert the point of a penknife under one corner, and the tissue will strip off quite flat, and in a condition to secure the best contact with the negative. In printing, let

there be a good broad safe-edge, and give sufficient exposure to get full detail out of all parts of the negative. For developing upon, clean some plates that are quite free from scratches and any defects, by immersing in dilute hydrochloric acid, and well rinsing in clean water, and coat with a substratum of—

Gelatine	1 ounce
Bichromate of potash	1 dram
Water	20 ounces

thoroughly well filtered; dry and expose for an hour or so to the light, when they may be stored away in boxes till required, as plates so prepared keep indefinitely.

If no prepared plates are on hand, and it is required to develop a transparency in a hurry, an excellent substitute may be quickly prepared by cleaning and polishing a plate and coating with iodised collodion, which, when well set, is plunged into cold water until alcohol and ether are eliminated, and upon this mounting the exposed tissue, after the usual immersion in clean cold water, taking the precaution to place a piece of india-rubber cloth or of single transfer paper between the tissue and the squeegee, so as to avoid scraping away the collodion between the edges of the tissue and the glass plate. The subsequent operations necessary for the transparency are too well known to need any further description.

Transparencies that need intensifying are treated with either a saturated solution of permanganate of potash, or with ammonia nitrate of silver, followed by the ordinary pyrogallic and silver solutions, the first method sufficing when only a slight amount of extra density is required, the latter when the transparency is very thin and weak.

A suitable transparency being obtained, we have next to consider the enlarged negative. This is best made, if above 12 by 10, by the wet collodion process in the usual manner, from which negative a print in carbon or in platinotype is printed, with the difference that for the platinum process a much denser negative is required than for carbon, so as to secure the proper amount of reduction in the shadows, without which the full beauty of a platinotype cannot be obtained.

Instead of making a carbon transparency by contract, an enlarged transparency may be made in the camera either on a gelatine plate or wet collodion, enlarged up to the size the picture has ultimately to be; this transparency must be carefully exposed, developed, and intensified, and, after drying, is varnished, when it may be retouched, and a carbon negative made from in the same manner as followed in making an ordinary transparency; from this carbon negative is produced the prints by the process as required.

Instead of using a transparency in carbon, it may be printed by contact upon a gelatine bromide plate, using the light of a good paraffin lamp to impress the image, and developing with ferrous oxalate; this method will often be found advantageous when time is an object, and the enlargement not very great, as if more than three or four diameters, a gelatine bromide transparency would be apt to give granularity.

A very elegant and expeditious method of making an enlarged negative from a small negative without the interposition of a transparency is by the use of collodion bromide emulsion as described by Mr. W. Brooks at the October meeting of the South London Photographic Society. Develop the enlarged positive with alkaline pyrogallic, well wash, and, without fixing, soak in a ten-grain alcoholic solution of iodine until the image is converted into iodide of silver; again wash, and re-apply the alkaline pyrogallic, when an enlarged negative will be the result.

We will now pass to the second class of enlargements, viz., those produced direct in the camera, the finest of which are collodion opals. To produce these beautiful enlargements in perfection, great care is required in all the manipulations. Special collodion and a special bath ought to be kept for them, when results can be obtained equal to carbon opals.

Collodion adapted for these pictures can be made as follows :—In 10 ounces of *pure methylated alcohol* dissolve 40 grains iodide of potassium, 20 grains iodide of ammonium, 20 grains bromide of cadmium, and 5 grains chloride ammonium ; when dissolved, add 120 grains of pyroxyline, shake well, and add 10 ounces methylated ether ·720, shake until cotton is dissolved, then allow to stand and settle.

Clean the opal (dead smooth) with pumice powder, and, after well rinsing, give a coating of gelatine 1 ounce, water 20 ounces (thoroughly well filtered), and allow to dry. Coat the plate with the collodion as above, and sensitise in a 20-grain nitrate of silver bath that is decidedly acid with nitric acid. Expose in the camera, and develop with pyrogallic acid 30 grains, citric acid 10 grains, acetic acid 1 dram, water 10 ounces. Flood the plate thoroughly, and do not keep more solution upon the plate than is sufficient to cover it ; lay upon a levelling stand, and when all the image is developed, wash thoroughly, and fix in hyposulphite. From soft good negatives these enlargements will not require any further treatment; but if the original is hard, it will often be necessary to soften down the shadows, which may be done by a solution of

Protochloride of palladium	1 drachm
Water	10 ounces

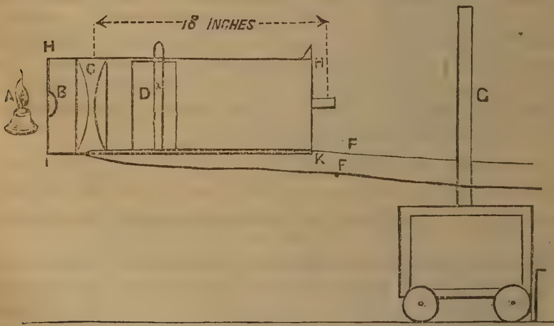
used after the picture has been dried so as to see exactly what modification is required.

Collodion enlargements on paper are produced in the same manner by substituting for the opal a piece of plain glass which has been polished with French chalk or talc before collodionising, proceeding as above, then backing up with Saxe paper (previously floated upon a 3-grain solution of gelatine, and dried), wetted, and laid carefully upon the film, then squeegeed into contact, and allowed to dry, when the paper is stripped off, carrrying with it the picture with a brilliant enamel surface.

There is still another method of making direct enlargements, that has lately been introduced, upon gelatine bromide paper, but as the makers send out full and concise instructions with each order, it is unnecessary here to give them ; results can be obtained leaving little to be desired, but not equal to those obtained on collodion carefully worked.

The same may be said of gelatine bromide upon opal, the exquisite sensitiveness being rather a drawback, as it is scarcely under sufficient control, and the method of development to be used not allowing any latitude in exposure makes the plates rather an expensive luxury, as by the slightest error the plate is spoilt, and the money as good as lost.

Now, having described the various methods of enlarging, it will, perhaps, be as well to describe the apparatus most suitable for use. The best plan of all is to select a room with a window having a northern aspect, and in window place one end of a square tube, say twelve inches square, and about two feet long, projecting into the room ; stop out all light from the window round the tube; about two inches from the window there ought to be a slot in which to slide a frame carrying the transparency (an old dark slide with shutter and door removed, and a skeleton door with sliding bars to clip the transparency when laid upon the carrier, substituted, will make an excellent frame), which will then be quite close up to the light; the lens is fitted into a box sliding inside the tube, to which may be attached strings, the one in front passing over a pulley beyond the transparency frame, and one behind carried to the easel; this easel moves to and fro upon a tramway, and is kept in position by a bolt pointed so as to clip the floor. Of course, the room is darkened, or only illuminated by yellow light, the only white light being that projected upon the sensitive plate upon the easel in front of the tube carrying lens and transparency (see diagram describing artificial light arrangement).



The above is calculated for nine-inch condensors. For daylight use, remove the lamp, the lenses B and C, have a slot cut for the transparency frame, and instead of the lens being a fixture as it is here, have D fitted so that the lens can be placed in front of it.

Another plan, but not near so handy, is to have a copying camera upon a heavy stand moving upon a tramway, opposite an opening in a shutter, the transparency being fitted in a frame so made that it can be moved both vertically and horizontally; but as this involves the use of a dark slide, it is at best only a clumsy way of working, especially if enlarging upon paper.

The bath-holder is the only other piece of apparatus different to the ordinary fittings of a photographic dark-room. For enlarging, this should be a Burton wave bath for comfort and certainty in working, made of well-seasoned wood lined with canvas and asphaltum, ironed down smooth with a flat iron, and finally coated with three or four coats of Bates's black. A bath so made will not leak, and if the Bates's black be applied at least once a month (if in constant use), no solution will ever fog.

For making enlargements in dark weather when daylight is uncertain, some sort of artificial light is often sighed for. It can easily be obtained, as either the lime light or paraffin may be employed ; the apparatus required being a pair of condensors, nine inches in diameter, together with a plano-convex lens three inches in diameter, the latter being placed with the flat side next to and close to the light, and arranged as in the diagram. A is the light ; B the small lens ; C the condensors. The position of the small lens to the condensors is so far away as will allow of the base of the cone of rays from it to a little more than cover the circle of the condensors. D, a box sliding inside a tube, H I K L, open at the top so as to admit the transparency carrier, X, to be removed when required ; F F are cords so arranged to adjust the transparency from G, the easel travelling in a tramway to carry the focussing screen. To anyone not caring to have the lime light, I can recommend Hughes' new Pamphengos lamp as being an excellent substitute, the light given not being far short of the lime-light, and far easier to manage.

For the lime light, nothing can be simpler in use than Chadwick's oxygen generator, as it entirely dispenses with the use of gas bags, with the attendant danger.

A CHEAP AND EFFICIENT FILTER FOR RESIDUES.

BY SNAVE.

For several years, when November came round, I used to have some bother and difficulty in securing, without waste, the deposit which had accumulated at the bottom and sides of the pans in which I save my washings—old hyposulphite solutions, developing solutions, &c. I tried filtering them through several thicknesses of blotting-paper in a large funnel. This was slow and sometimes annoying work, especially if a hole happened to get made through the paper by accident or otherwise.

Then I tried the hat trick, but not having any clerical acquaintances whom I could persuade to part with their soft felt head-gear, I was at a disadvantage, and vainly attempted it with one or two of my own left-off coverings, but they were made of the hard felt, and were more or less of a failure, as it took days, even weeks, to get the residue fairly dry and fit to send to the refiners.

But now I have no trouble to manage it whatever, as I simply get a piece of old felt carpet, and fasten the edges to a frame (a butter cask hoop answers capitally) something after the style of a jelly bag, and the contrivance answers admirably in every respect.

I usually start filtering in the morning, and if the arrangement is about eighteen inches square and about six inches deep, a few hours are sufficient to filter the contents of a very large pan. I let it drain throughout the day, and when business is over for the day hang it over the stove. Next morning usually the precious mud is in a dry powdery state and fit for sending to the refiner. I then take the waste, and pack in paper, and the filter I burn with the paper cuttings, &c.

PORTRAITURE BY GASLIGHT.

BY P. MAITLAND LAWS.

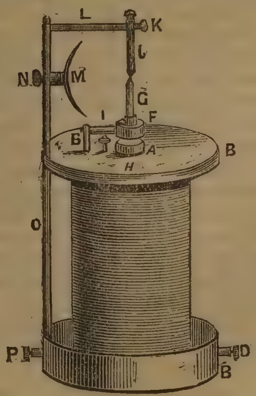
PERHAPS a few comments from a business point of view may be more acceptable just now than a repetition of the various mechanisms embodied in the apparatus described in last YEAR-BOOK. This is the third season for it, and its practical utility may be considered established. The advantages of having such a ready artificial light at hand have been remarkably impressed during the commencement of this winter. November being exceptionally fine and clear, gave a great impetus to photography generally, which must have been noted by most in the profession, and no doubt many have been the sitters turned away when the too early darkness came on. It is all very well having rapid plates, rapid lenses, huge reflectors ; but the hour comes when they are of no avail. Four o'clock, and dark ! sitters still in waiting. With reluctance they are told to go. Will they come again to-morrow? Exceptionally, yes ; but as a rule, no. It is for this phase of business that I would advocate the employment of artificial light ; this is its really legitimate purpose, and to this end should be used electric, pyrotechnic, or gaslight. An extra hour in a winter's working day is occasionally of great value, and the photographer possessing any practical artificial light has a powerful advantage. Speaking from experience, the setting of a special hour or two of the night is not a step in the right direction, and, apart from the question whether business may or may not be done, it is a great strain on the powers of those engaged after a fair day's work. A great indirect advantage in popularising artificial light for portraiture is the fact that people have less hesitation in being taken on dull days now than formerly, knowing one is not altogether dependent on Sol.

I may mention that in practice little or no modification in mode of working has been found necessary than as formerly described. The light is raised a little higher ; this means a trifle more exposure, but the result is better. In practice the exposure is not found so important as it may appear, the light being easier for sitters than daylight, possibly from the fact of the eyes looking into darkness. With the oxalate developer and rapid plates, from twenty to twenty-five seconds is customary ; of course, with pyrogallic development, much quicker exposures are made, but preferring the former for daylight work, I have adopted it for gaslight, and for the time being, am satisfied.

THE INDUCTION COIL IN THE STUDIO.

BY SELIMO R. BOTTONE.

The advantage of being able at all times to take a photograph is so patent to all engaged in our business, that any effective means to secure this desirable result will always be gladly hailed by the professional photographer. It must be admitted that few of our brethren are electricians, and consequently we are obliged to make use of such appliances as are found in the market, and which are in most cases constructed for ordinary lighting purposes, and not specially for photographers. Now, although there can be no doubt that a dynamo-machine or a good fifty-cell Grove's or Bunsen's battery, connected with an automatic lamp, will give excellent results, yet it must be conceded that the expense (and, in the case of the batteries, the mess and inconvenience) inseparable from this mode of obtaining the electric light will ever prove great drawbacks to its employment. But it must be borne in mind that a light which for reading purposes would be inadmissible, may be very serviceable in photography. The rapid pulsations which render the light of the induction coil objectionable for reading or ordinary lighting purposes are absolutely of no consequence whatever to the photographer; and as an induction coil specially designed to give a very brilliant and "thick" spark or light may be constructed and worked with comparatively very little expense, it struck me that an effective and cheap electric light might be produced in this manner. I have devoted much time to putting this into effect, and give the following outline of my experiments, as an inducement to others to try the same, as it has yielded satisfactory results in my hands.



Two discs, six inches in diameter, B B, of which one is about an inch in thickness, the other being only one quarter, are cut out of a piece

of well-seasoned mahogany. A circular hole, one inch in diameter, is cut in the centre of each disc. Both discs are then placed in a round pie-dish, covered with solid paraffin (paraffin wax), and placed in an oven, where they are allowed to remain until the paraffin has melted and thoroughly soaked into them. They are then removed, wiped while warm, and allowed to cool. A piece of brown paper twelve inches square is rolled round a ruler nearly an inch in diameter, and the edges glued down, so as to form a tube which shall just enter the holes in the discs. This tube, when the glue is dry, is also to be soaked in melted paraffin until thoroughly saturated, as were the discs. When this is the case it is removed from the paraffin, allowed to drain and cool, and then the two discs are glued at opposite extremities, so as to produce a kind of reel or bobbin. A number of pieces of perfectly soft iron wire, No. 18 B W guage, twelve and a-half inches in length, are now cut and inserted into the tube, adding always in the centre until no more can be forced in, the ends projecting at the thin disc end as shown at A, but being quite flush with the thick-end disc. If the ends at A are not quite level, they are to be rendered so by filing. This being done, a small hole, one-sixteenth of an inch in diameter, is drilled through the thin disc as near as possible to the paper tube, without actually touching it.

Three pounds of the best silk-covered copper wire, No. 24 guage, previously soaked in melted paraffin, are now to be wound on the bobbin, beginning by passing about six inches through the thin disc (from the inside outwards) for after attachment to the pillar E. The wire must be wound very evenly and closely until it reaches the opposite disc, when one layer of paraffined paper is rolled tightly round this first coil of wire, and the winding continued in the same direction, but back to the opposite disc, and so on alternating layers of wire and paraffined paper, until nearly all the wire have been used up. If the dimensions given have been followed, it will be found that the last winding will leave a few inches of wire free, when the thick disc has reached the fifth time. The free end of the wire, having had its covering scraped off, is to be soldered to the binding screw, D. No break in the wire or its coating is admissible; it must be continuous from end to end. A short stout brass pillar, E, furnished with a screw at its lower extremity, is now screwed into the thin disc, care being taken that it does not disturb the wire below. The free end of the wire protruding from the small hole is now soldered to this pillar, a portion of its silk covering being removed for this purpose. A pretty strong brass spring, I, carrying at one end a soft iron armature, F, is screwed or soldered to the top of the pillar, E, in such a manner that the iron bob or armature, F, is just over the bundle of iron wire, A, at a distance of about three-sixteenths of an inch. In metallic connection with this armature is a split brass ring, which serves to clip the lower carbon (graphite), G. A stout brass rod, O, carrying an arm, L, also of brass, passes through holes made in both discs, and is in metallic connection with another split ring, at K, which serves to hold the upper carbon, J,

which can be adjusted so as to touch the lower carbon by means of the thumbscrew, K. Another binding screw, P, in metallic contact with the rod, O, and a sliding mirror, M, adjustable by the thumbscrew, N, completes the coil. Such an arrangement, worked with six bichromate cells, quart size, will give a light equal in intensity to that produced by forty Grove cells of equal size, without any fumes, very little trouble (since the six bichromate cells are easily charged, and if made so that the plates can lift out bodily, may be used several times without unchanging), and at a trifling expense. Such a coil will bear twelve bichromate cells, and give a light of correspondingly increased intensity. It will be seen that the peculiarity of the arrangement consists—1st, in using the spark produced on breaking and making contact by the attraction of the armature, F, as the source of light; 2nd, in using only the primary current, and its accompanying "extra current," as the source of light; 3rdly, in taking advantage of the fact that the current induced in comparatively thick wires is of greater quantity, and consequently gives a more brilliant light, than that evolved in thin wires.

To set this coil in action, the poles of a six-celled bichromate battery (without porous cells) are connected to the binding screws, P and D, the upper carbon pencil, I, lowered until it touches the lower carbon, G, when it is clamped by the thumbscrew, K. Directly the two carbons touch, the armature begins to vibrate rapidly, and the light is produced. The rapidity of the vibrations, and hence the equality of the light, can be controlled by the screw, H, which, pressing more or less against the spring, I, makes it more or less resilient.

No precautions are taken against the consumption of the carbons, as the oscillations of the armature continue sensibly equal for two or three minutes, which is more than sufficient to take any subject; when a fresh adjustment of the upper carbon can easily be made.

In the illustration, for the sake of showing clearly the parts, the length of the upper and lower carbons has purposely been exaggerated. It should be kept as short as possible (say, not more than one inch for each), since the carbon presents a considerable resistance to the passage of the current, and hence weakens the light in proportion to its length.

HOLMES' OZONE BLEACH.

BY A. B. T.

I WILL state a little experience of my own in connection with Holmes' ozone bleach, which is a most excellent reducer for dry plates.

I had a negative which had been very much over-developed, so I poured over it a solution of the bleach (1 to 4 of water), and found that it was considerably reduced, but that there remained on the surface a whitish film, which resisted any amount of washing. I accordingly poured over it some of the hyposulphite fixer, which not only removed the white film, but also seemed to have the effect of rendering the plate clearer. I have tried this plan again, and with the same result.

WET PLATE BOX.

BY J. J. MORGAN.

I GIVE you particulars of a wet plate box of zinc for field work. I use Mr. Alfred Hughes' process, given in YEAR-BOOK 1874, so require no washing until I fix the negatives at night.

For half-plate size, take a piece of cardboard, 8 by $6\frac{1}{2}$ inches, mark the internal dotted line by placing a half-plate upon it, and marking the margin; cut the corners as shown by the dark line, fig. 1; turn up

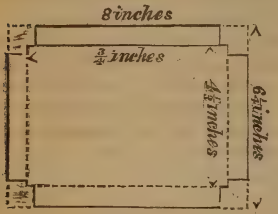


Fig. 1.

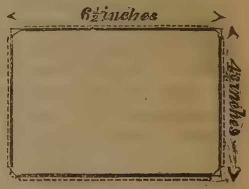


Fig. 2.

at the dotted lines, which will give about one and a-half inches, forming the sides of the box, with pieces about quarter-inch projecting at each corner; see that half-plates will fit well into the cardboard box, and by this pattern cut your zinc box. Have six pieces of flannel cut to the same size as your half-plates, and have six elastic bands.

For filling with wet plates, the flannel pads are moistened; one or two placed at the bottom of the box, then a plate, film upwards, then an elastic band over the outside of the box (see fig. 2); the band will be found to cross the corners of the plate, making a support for the next plate, which must be placed film downwards, then a pad; fill up the remaining plates as the two first.

The elastic bands, if thick, may be cut into two. India-rubber bands and tubing may contain sulphur; this I get rid of by boiling them for a few minutes in a strong solution of caustic potash, then wash in water.

TWO PRACTICAL NOTES.

BY J. BARKER.

IF troubled with blisters on your albumenized paper, make the silver bath fifty-five grains to the ounce, and float twice your usual time; the longer the albumenized paper is kept on the silver bath, the less will be the tendency to blister.

It is sometimes desirable to have copy of autograph at the foot of a portrait; this has usually entailed some separate process; it may, however, be accomplished in one printing by the following method. Coat a sheet of paper with gelatine containing a small proportion of gum; write the desired inscription upon this with a solution of either

bichromate of potass or chrome alum. Then scrape clean the portion of negative required for the autograph, damp the gelatine paper, and affix to the vacant space; next expose to the light for a short time, then wash in tepid water, which will remove the paper and gelatine not acted upon by the alum and light, leaving the autograph in insoluble gelatine, the right way for printing.

IS PHOTOGRAPHY A FINE ART?

BY T. H. JOYCE.

Is photography one of the fine arts? This was a question recently asked in somewhat a sarcastic tone during the cosy chat which follows the departure of the ladies after dinner. There was almost a unanimous chorus in the negative. "Not a bit of it," cried one; "it requires no artistic talent." "Just so; it is merely a mechanical process," exclaimed a second. "Why, there is no colour in it," chimed in a third; while a fourth sententiously remarked, that it "merely reproduces things just as they are." Absurd as all these statements appear to those who know anything beyond the mere rudiments of photography, they nevertheless represent the opinions of nine-tenths of the world at large, who look upon the camera as merely a vehicle for cheaply reproducing their friends' portraits, or as furnishing them with a rough remembrance of their holiday trips. Notwithstanding the advance of radicalism, so dreaded by the editor and the readers of a certain evening journal, people are terribly conservative in their ideas of art, and at present cannot allow anything to be a fine art which has not been produced by the tools of Apelles and of Phidias. Mechanical, forsooth! The actual photograph is certainly produced by taking off a brass cap or pulling the string of a shutter. So is a painting (mechanically speaking) by the daubing of colours on canvas; but, to be successful, the photographer must have no less artistic an eye than the painter, must select his subjects with no less care, must exercise his judgment as regards lights and shades and picturesque effects with no less skill, and must be as dexterous in his development and printing as the painter or sculptor is in his finishing touches. Any one, it is true, can "take" a photograph, and there are few people who cannot draw at least a semblance of a house or of a tom-cat, while a boy, destitute of any artistic talent, may be easily taught to make a mechanical drawing of a locomotive to scale; but to make a picturesque reproduction of either of these subjects needs the inspiration of a true artist, whether he be painter or photographer. Unfortunately for photography, the pioneers of the science could scarcely be called artists, nor did they aim at artistic effect; their chief object was simply to secure a correct image of their model, and what the model was they recked little. The immediate application of photography to portrait reproduction followed the discovery of the Daguerreotype, and from that time until recent years—until, in fact, the introduction of the dry-plate system—photography was regarded more as a commercial speculation than as a fine art

pursuit; and, with some few noteworthy exceptions, votaries of the camera were ranked scarcely above the standard of tradesmen.

It was this state of things that impressed people with the notion that photography could never attain the level of an art. And yet, as a matter of fact, it was not the science, but the man who practised it, who was to blame. Of late years men have arisen who do not regard photography as a simple means of obtaining so many dozen copies of Mr. X.'s face or of the latest monstrosity in architecture or bridge building, but strive to make the result of their labours no less true works of art than the productions of a painter's studio. They seek far and wide for picturesque subjects at home and abroad, on land and at sea, in pine forests or amid the mountain wilds of the Alps, Himalayas, or the Rockies, they drape their human models with as much care and thought as the most fastidious sculptor, and are now beginning to produce *genre* pictures of no mean order. Even the most arrant depreciator of photography could hardly affirm that it is mere mechanical skill which has enabled Mr. England or Mr. Frith to produce their well-known views, Mr. Dixon his animal studies—his photograph of the adjutants at the Zoo is quite Marks-like in its humour—or Mr. Vernon Heath his admirable enlargements. Take, for instance, his splendid photograph of Windsor Castle from Eton Meadows. Will any one affirm that no artistic talent exists there?

Still, it must be admitted that even now the everyday photographer is hardly an artist in the true sense of the word, but is simply a producer of photographs, and it is surely time that something was done to take away this reproach from the profession. There are many amateurs who, possessing a slight art education, and an eye for the picturesque, take, artistically speaking, far better photographs than the skilled mechanical operator. And this, again, brings me to the assertion that if people deny to photography the rank of a fine art, it is the fault simply and wholly of the photographer. On the walls of the recent exhibition at Pall Mall there were numerous figure subjects and fruit and flower groupings which would well bear comparison from an art composition point of view with many a picture which hangs on the line at Burlington House. Some of the best illustrations, both in our journals and books of travel, are from photographs; indeed, one of the most brilliant woodcuts that appeared in the earlier numbers of the *Graphic*, the "Dhul Canal, Cashmere," was engraved direct from a photograph without being in the least retouched by an artist. The lights and shades, the tones and half-tones, of this picture are simply perfect. Plainly speaking, what the modern photographer wants is an education in the artistic branches of his profession as complete and searching as that accorded to a painter. At present men are taught the mechanical operations, are carefully impressed with the virtues of this emulsion, of that developer, and of a particular lens; but they are left to find out the artistic aspect of photography for themselves. How few are even instructed in the mere rudiments of art proper; and without that they certainly can never hope to advance

their profession to the rank of that of a fine art. Surely it would be feasible to organise a Photographers' School of Art, in which artists of acknowledged merit should be invited to lecture and demonstrate. Such an institution would be hailed with delight, not only by professional photographers, but by numbers of amateurs who now make the camera an invariable travelling companion during their early "walks abroad." But it is mainly in the interests of the art itself that I venture to make such a suggestion.

ON THE ELECTRIC LIGHT.

BY DR. H. W. VOGEL.

At the Electric Exhibition at Paris, there was shown much that was new in respect of electric lighting; a large number of "systems" for illuminating purposes were brought to our notice, and some of them seemed to promise very well, though perhaps the promise may not in all cases be redeemed. I had myself visited the exhibition in the hope of finding something there which might be of use and interest for photographers, and I was more especially anxious to become acquainted with the incandescent lamps, which are as yet not known in Germany. As was proved in the exhibition, these lamps are excellent for the illumination of rooms, workshops, &c., but they are of no value for photographic work; the light they give is yellow, and has no greater actinic action than that of ordinary oil or gas lamps. The incandescent lamps of Regnier and Werdermann, which are open to the air, although they give a brighter and clearer light than the carbon threads in the air-exhausted glass globes of Swan, Edison, and Maxim, are not chemically any more effective than the simple electric arc.

The latter we know can be used for taking photographs, and, so far as I can ascertain, Vander Weyde's system is the best for this purpose. In the Paris Exhibition M. Liébert had established an electro-photographic studio, and a complete arrangement for taking portraits on this principle, but it did not appear to be very largely patronised by the public. Vander Weyde's arrangement, as we all know, consists in placing the electric light in the centre of a spherical reflector lined on its inner surface with white paper. In front of the light is a small opaque mirror which prevents the dazzling rays from falling direct on the sitter.

The question has often been asked, how much light is lost by reflection at the paper surface of the reflector, and I have now endeavoured to obtain an answer to this question by means of photometric experiments carried out with gaslight. In the absence of a spherical reflector I employed one of cylindrical shape, which I had made out of a sheet of white Bristol board.

In the first place I used a Bunsen photometer to measure in the regular way the illuminating power of a gas-burner; then, in place of the burner I placed a white cylindrical reflector of twelve inches diameter, and moved the burner to its centre. To cut off the direct action of the light

upon the photometer, a small opaque screen was placed immediately in front of the burner.

Several experiments were made with this arrangement, and the measurements taken gave the interesting result that the light reflected from the cylindrical reflector was actually a little brighter than that thrown on the photometer from a source placed at an equal distance, but not provided with a reflector. This result seems at first sight to be contradictory, though in reality it is in accordance with well-known optical laws. When the burner has no reflector, only the pencil of rays act effectively on the photometer; all the other rays are dispersed over the surface, and are of no account; consequently, only a small part of the light given out by the burner is effective. But when the reflector is placed behind the source of light, it collects a large portion—almost half—of the rays, and though a part of them is absorbed by the paper, the quantity which falls on the photometer is still sufficient to produce a greater effect than the small pencil of rays.

Hence we see that Vander Weyde's reflector is equally effective in illuminating an object, as an electric light without a reflector placed at the same distance; but it is far less dazzling than the latter, because the rays, though they give the same amount of brightness, are distributed over a greater surface.

OXIDES AS SENSITIZERS.

BY CAPT. W. DE W. ABNEY, R.E., F.R.S.

As the Editor has requested us all to write briefly, I will take the hint. I am not aware that inorganic sensitizers have been much used with emulsions except for experimental work. I have myself used nitrites and sulphites, but there is one class I have never used till lately, and those are certain metallic oxides. If a collodion emulsion, for instance, be prepared with zinc bromide, and the silver be dissolved in water, and then ammonia added till the oxide just re-dissolves, on the addition of the silver to the bromide zinc oxide is precipitated together with silver bromide, and the oxide is consequently in close contact with the latter. The ammonia present is not sufficient to re-dissolve the oxide, and, after washing, there are proofs that the oxide is present. If such an emulsion be washed, and the bromide be in excess, it becomes excessively sensitive; more so, in fact, than an emulsion prepared with an excess of silver nitrate.

The action of light being to liberate bromine, it readily combines with the zinc oxide, forming a stable salt, and the image certainly keeps intact fairly well. The sensitiveness of a film depends on two things: one on the presence of a bromine absorbent (and the more affinity it has for bromine the more rapid the plate); and second, on the close contact of the absorbent with the sensitive salt. The zinc oxide possesses both these properties. When we take into consideration gelatine films, it will be found that it fulfils the last condition better than the first. The question arises, would it not be possible to increase

the sensitiveness of gelatine plates by some means which better fulfils it? It may, perhaps, be found that in the preparation of a gelatine emulsion with ammonia, a metallic oxide may increase sensitiveness, though gelatine is a ticklish thing to which to make any additions.

It is believed that crystalline bodies will not answer well in any case; but if an inorganic substance can be found which precipitates in a gelatinous form without injuring the properties of the gelatine, it will be a decided gain.

UPON GOLD FRAMES.

BY EDWIN COCKING.

I FANCY that if all the pictures sent to any photographic exhibition were put into *gold frames*, the effect upon the whole mass would be something to be remembered. Very few seem to have any idea of the effect produced by pictures placed in juxtaposition which have qualities totally opposed to each other. There are many things to be considered: colour, depth of tone, detail, broad contrasts of light and shade; and these are again influenced by varieties of colour in the various frames at present used: from shiny black, through rosewood, dead brown, whitey brown, pale yellow, to pine wood coloured by varnish. All these various colours sometimes act in violent opposition, but never come into any harmonious combination, so that one is reminded of an orchestra, where each instrument possesses elements of beauty; but when combined, as in the act of *tuning*, nothing but ugliness is the result.

Now, if we could for once persuade all future exhibitors to send their pictures in nothing but gold frames to the exhibition, never afterwards should we see anything else, for the result, I venture to predict, would be so startling in its general aspect, and also so beautiful and pleasing, that the contents of the frames (which are like gems made or marred by thair setting) would reveal themselves a thousandfold better than heretofore. And why should it not be so?

The painters are compelled to send their works in gold frames; this has been the consensus of artistic judgment for many, many years, and no one knows better than the painter how his work only seems finished, and takes its proper place the moment it becomes attached to its ever future companion—the gold frame. And as photography is fast approaching the domain of fine art in its capacity to produce a thing of beauty, why not show that this is really a fact by making our exhibitions equally as effective as the painter's are? And one of these conditions will be found to be the putting on, I will term it, the court dress, and thereby gain splendour by the oneness produced when all are required to appear in similar externals.

My notion is that a photograph in a gold frame assumes at once the importance of being *one* by itself; but as soon as it is placed in any other frame, and especially one of light wood, it simply becomes like an en-

graving—one of many. When this fancy becomes a fact, then shall we look back upon the past with feelings of shame that such a simple matter had ever been overlooked.

A SIMPLE SENSITOMTER.

BY J. R. SAWYER.

THE method I am about to describe is one that I have employed for some time in ascertaining the sensibility of dry plates, &c. The apparatus consists of an inexpensive lantern, three sides of which are composed of wood, the front being glazed by a piece of ordinary white glass over which is hinged a shutter glazed with ruby glass, the back of the lantern being made to open as a door. The lantern has in its interior a tin socket to hold the *standard* candle.

A plain deal board, thirty-five inches in length, is provided; across this board, at a distance of ten inches from the end, is screwed a small batten three-quarters of an inch thick by one inch wide; to the other end of the board is fixed a piece of wood the same substance, and about eighteen inches high, securely fastened at right angles to the base-board. This upright piece has screws in it at different heights to serve as supports from which to hang a small pressure-frame.

It will be seen that this is a simple contrivance for burning a standard candle under equal conditions, and exposing the object of which it is wished to ascertain the sensibility at a constant and known distance from the source of light.

The next thing is to prepare a scale of different degrees of density. This is most easily effected by following the method employed by M. Lambert for his actinometer. Cut a piece of mineral paper into strips one inch in width; cut off one piece six inches in length; cut the next piece five and five-eighths; the next five and a-quarter, and so on until you have provided twelve strips, each one being three-eighths of an inch shorter than the preceding one. Now dispose these carefully in order, attaching each with a touch of strong gum where the ends all come together. It will be manifest that you have here a scale containing twelve steps of different densities, and which would be capable of being used at once, but for the fact of the mineral paper changing colour by time and exposure to light.

From this graduated scale the standard scale is made, either by means of carbon tissue, or an ordinary dry plate.

To make the standard scale upon a dry plate, it is simply necessary to put the paper scale in an ordinary pressure-frame; upon this place a dry plate, and expose to gas or candle light. The plate is now developed (by preference) with ferrous oxalate, treated in the usual manner, and intensified if necessary. The plate should now be varnished, and it is then ready for numbering. With a quill pen, or fine camel's hair pencil (using Bates' black), number the steps from one to

twelve in bold Roman numerals, the lightest step being number one, and the numbers going consecutively up to twelve.

The next thing thing is to decide upon the standard candle. I find the best hard sperm give uniform and reliable results; I use the size known as short sizes, made by Marchant and Co., Berners Street. The wicks are exceedingly well made, and I find that the amount of light given off by each candle, and by any portion of the candle, to be as nearly as possible identical.

We have now provided a standard candle, with a means of burning it in a lantern, so as not to be affected by draughts or currents, and which can be placed at a definite distance from the plate of which it is desired to ascertain the relative sensibility.

The employment of this little apparatus is simple to a degree. Place one of the standard candles in the lantern, light it, and allow it to burn down below the conical top; in the meantime place the standard scale in a small pressure-frame, and upon it place the dry plate of which you desire to know the sensibility; hang the pressure-frame on to one of the screws in the turned-up end of the base-board in such a position that the centre of the scale is opposite the flame of the candle when the lantern is placed in position *behind* the batten screwed across the base-board; taking out your watch, open the ruby glass shutter, which must, of course, have been kept closed during the preliminary operations; expose for a definite time (say, thirty seconds); at the expiration of that period close the ruby glass shutter, and develop the plate in the usual way.

Should you find that the whole of the scale has printed through, it will be necessary to shorten the time of exposure, and make, perhaps, fifteen or twenty seconds the standard time; on the contrary, if only four or five numbers appear, it will be necessary to lengthen the time of exposure, the object being to get an exposure which will give about three parts of the scale, so as to allow a margin for extra sensitive plates; and when the time of exposure is ascertained, always keep it exactly the same.

It will be advisable to blacken the inside of the lantern, and also the base-board. The lantern itself should be made with the usual precautions against the escape of white light, and be well ventilated top and bottom; a very suitable size will be found to be fifteen inches in height, and ten inches square. The distance between the flame of the candle and the sensitive plate should be about twenty-eight inches.

A SIMPLE LAMP FOR DEVELOPING.

BY L. MACDONA, B.A. (OXON.)

SOME one has, I believe, suggested a *bandbox* for drying gelatine plates, but I have not heard of that useful domestic receptacle turned into a *lamp*.

I get an ordinary bandbox (preferably a new and undamaged one), and cut a large square or oblong aperture out of the front, and paste

one thickness of ruby calico over it. I then cut a hole about three inches square or oblong from the lid to allow the hot air from the candle or lamp to escape without burning the lid. At the four corners of this hole I glue four little pegs, half-inch in height (cut from a pen-holder); these pegs support an inverted and blackened tin dish, which effectually excludes the light, and at the same time allows perfect ventilation. It only remains now to bore holes with a hot wire (not a brad-awl) all round the bottom of the handbox, and one has a splendid lamp which, when a candle is inserted, and the lid and tin top put on, gives a perfectly safe light, and one which it is a pleasure to work by.

BITS OF EXPERIENCE IN THE STUDIO.

BY G. CROUGHTON.

Enlarging by Artificial Light.—Since I have used Morgan's Argentic Bromide Paper, I have made myself independent of daylight for ordinary enlargements, that is, enlargements for finishing either in black and white or colour. There is no expensive apparatus needed; the only thing that is not in every photographer's studio, and will have to be bought, is the condenser, and the one I use, which is five inches in diameter, cost me 7s. 6d.; that and the chimney are the only part of the apparatus I have not made myself, The light is an ordinary round burner paraffin lamp; a packing-box 18 in. by 14 in. and 10 in. deep, is stood upon one end, a hole is cut for the condenser, which must be most carefully adjusted so that the flame of the lamp is in the centre, and the lamp as carefully adjusted to the focus (with the five inch condenser the focus is 11 inches). Outside the box where the condenser is fitted, a frame to carry the negative is adjusted in such a manner that it will enable it to be moved from right to left, or up and down. A carte camera with lens is placed with the back part (of course the ground glass being removed) of the camera next the negative, and the lens pointing away; a board with a strut behind it to keep it up receives the paper; a hole cut in the top end of the box over the lamp glass is covered with a tin chimney like a magic lantern chimney. This is, in fact, a rough magic lanthorn, the condenser being an ordinary plano-convex lens such as are used in bulls-eye lanthorns. There is no need whatever for an expensive double combination condenser. In the side just behind the lamp I have cut a square hole, and glazed it with ruby glass, so that I use it both as a lanthorn to enlarge by, and for working with also. My method of working is as follows. Say I am going to enlarge to 12 by 10. I have a piece of white paper the exact size 12 by 10, placed in the centre of a 15 by 12 glass. This is adjusted upon two pegs upon the board. When the negative is focussed upon that, and properly adjusted for position, a cap with ruby glass is placed over the lens, and the gelatino-bromide paper (which has been previously soaking in clean water out of the way of the white light thrown upon the board) is laid down, face up, upon a

clean 15 by 12 glass, which is then placed upon the pegs where the focussing screen had been; it can be adjusted to a nicety, as the picture is plainly seen through the ruby screen. When in position the cap is taken off, and the exposure commences; this will vary from 1 minute to 15 according to the density of the negative. For developing, I have another 15 by 12 plate, upon which have been laid four narrow strips of gutta-percha, making a very shallow tray, the glass forming the bottom, the strips of gutta-percha the sides, inside size of tray 12 by 10. The exposed paper is taken off the plate upon which it has been exposed, and laid down upon this tray; the finger being run round the inside of the gutta-percha strips, the paper turns up and forms a tray of itself; into this the developer is poured, and rocked about till completed.

A USEFUL SHUTTER.

BY J. J. DICKINSON.

FIGURE 2 is made out of the lid of an old compass box, and is made to

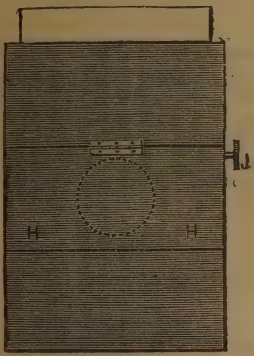


Fig. 1.

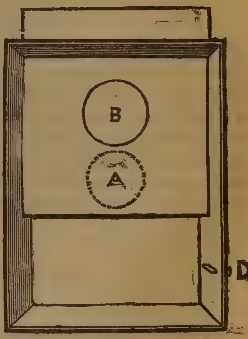


Fig. 2.

fit tightly on to the lens. In the sides grooves are cut, in order to receive a sliding shutter. This sliding shutter has an opening rather larger than the diameter of the lens, and, when released, it drops of its own weight, and the aperture B passes rapidly in front of the opening of the lens A. At D there is a catch to arrest the shutter when the aperture B is opposite the lens for focussing. Figure 1 is the same shutter, with pieces of wood nailed across. The part H is hinged and worked with a mill-head, J, that so, when long exposures are required, the flap can be used instead of the drop.

Figure 3 is a side view of the shutter. M is the hollow box-lid, fitting on to the lens N. P is the sliding shutter working in the

grooves; the aperture is at the black line, R. I need scarcely say that when the flap is used, the aperture R (fig. 3) must be opposite the lens

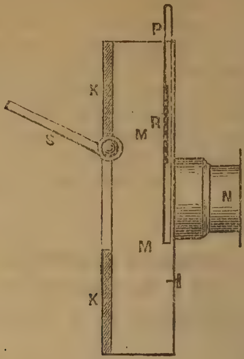


Fig. 3.

opening. I have found the above shutter very useful, and have used it both for out-door and in-door work with great success. Since making the above, it has struck me that the flap and drop might both be used at the same time for instantaneous exposures; the shutter might be so made that (the aperture R being opposite the lens) when the flap S is raised, the drop shutter P might be caused to drop, so that the exposure would commence with the flap and end with the drop, the flap serving also as a sky-shade.

CORRUGATED PAPER PADDING.

BY G. S. PENNY.

Having recently received from a chemical firm some bottles securely packed in an ingenious way, and one new to me, it suggests that many uses may be found for the material in connection with photography. It consists of two sheets of a cheap brown paper, one flat and the other corrugated, cemented together in section. I should think dry plates or negatives buffered with a double layer of this packing might almost defy the destructive tendencies of railway carriage.

It may be used advantageously in the bottoms and the lids of plate-boxes to prevent concussion, and may even take the place of wood grooving in such boxes, taking two negatives back to back in each groove; and if the box be kept in a vertical position the plates would be safe.

In a modified form—that is, with the grooves the width of a single glass—and the corrugations compressed and solidified, it would form a useful kind of grooving, which I suppose the manufacturer could construct if there were a demand for it.

EXHIBITION NOTE.

BY PAYNE JENNINGS.

THE Exhibition of the Photographic Society of Great Britain for 1881 must, on the whole, be considered a successful one ; at least, this will, I think, be the opinion of all who have gone carefully through the exhibits, and noticed, particularly among the smaller examples, the great advance in artistic taste during the past year.

Cleanliness of manipulation is also very remarkable, and this feature is undoubtedly owing to the comparative ease with which the now almost universal gelatino-bromide process is worked. There can be little doubt also that the introduction of this process has made a complete change in the character of the work sent for exhibition. But whether or not an advance has been made in the higher grades of the art, is a matter that will create some divergence of opinion. It cannot, however, be doubted that, among second and third-rate workers, an all-round advance has been made, the late Exhibition at Pall Mall making this fact unmistakably apparent.

It cannot be said that there are few specimens of the wonderful power of rapid execution which the new process puts us in possession of, because there are many remarkable and praiseworthy examples in this direction ; but, when we consider the extent of the power at disposal, the late Exhibition must be considered disappointing in this respect. It must not, on the other hand, be thought for a moment that it is meritorious to photograph anything and everything that happens, for the time being, to be passing in front of the camera, as, if this be done without previous thought as to what is desired to be depicted, the result, considered pictorially, must of necessity be a failure. And (while on the subject) it may be well to mention how comparatively few photographs are taken that have been the result of much previous study. This is, however, a matter of much seriousness, and one that must occupy the minds of all those whose ambition it is to produce work that will give something more than temporary gratification, and who believe with the poet, that "a thing of beauty is a joy for ever."

MOUNTAIN EXPERIENCES WITH A CAMERA.

BY J. S. ANDERSON.

WHEN making arrangements this year for my autumn trip to the peaks and glaciers of the Tyrol and Switzerland, the "happy thought" struck me of adding a "photographic camera" to my usual impedimenta, as being likely to add increased interest and definiteness to my tour, and leave me the possessor of better reminiscences than can be obtained with pencil and sketch-book of happy hours spent on "peaks, passes, and glaciers." After some little hesitation, a 5 by 4 camera was decided upon ; this size would, I thought, not be so heavy as to seriously encumber the movements of myself or guides when climbing, and would come in well for 15 by 12 enlargements.

With three double-backs, dark-cloth, drop-shutter, and a Ross' rapid symmetrical lens, it fitted closely into a solid leather case measuring $7\frac{3}{4}$ by $7\frac{3}{4}$ by $6\frac{1}{2}$, the weight of the whole being exactly five pounds.

In addition, I enclosed the three backs in a small black bag with a buttoning flap for greater security, and for use when the leather case was not taken, which happened several times on the more difficult mountain excursions. Instead of using the case, I simply wrapped the camera and slide-bag in my black cloth, strapped them round, and carrying the lens and shutter in my pocket, the package found a quiet resting-place in the sack of one of the guides. In this form the weight was only three-and-a-half pounds.

The tripod taken, when closed, made a good alpenstock, and was fitted with a brass ferrule, steel pointed, giving it additional strength, and enabling it to be of use in walking. The plates chosen were the "Belgian," as I had been experimenting with them some little time before starting. Thinking that the clearness of the air at heights above 8,000 feet would likely call for quickest possible exposure with *fast plates*, I had a special batch made for me of medium speed. The shutter chosen was an ordinary drop one, fitting on to the front of the lens, and obtained from Messrs. Harvey, Reynolds, and Co., Leeds, working at its quickest in $\frac{1}{5}$ of a second. The necessity of a shutter was fully proved by the results obtained, as, in many cases, over-exposure had to be recorded.

My only other luggage consisted of a knapsack and ice-axe. With the former on my back, the latter tied to my tripod, and two dozen plates strapped to the bottom of the leather case, I found myself quite independent of porters at railway stations, steamboat piers, &c.

London was left on Saturday morning, July 30, and, travelling *via* Calais, Brussels, Cologne, and Munich, Innsbruck was reached about 10·30 p.m. on August 1st. Through the kindness of friends accompanying me during part of my trip, I was enabled to take three dozen plates in addition to the two dozen strapped to my case. Of the former, however, I only needed to use one dozen, and this partly to make up for badly-cut plates, which would not fit into the backs.

Innsbruck was left on Tuesday, August 2nd, for Franzenfeste, where we changed carriages for Toblach on the Pusterthal Railway. Between Innsbruck and Franzenfeste the train crosses the summit of the Brenner, with magnificent views on either side all along the line. From Franzenfeste to Toblach the scenery gradually increases in grandeur and magnificence. There is plenty of scope for the photographer in this beautiful valley, and never-ending views might be obtained. We were, however, bound for the Dolomites, some of the most northerly peaks of which we could see rising boldly in jagged outlines to

the S. and S.W. The train moved at a veritable snail's pace, giving us the opportunity of jotting down a few rough sketches *en route.*

After spending the night in the large and well-managed railway hotel at Toblach, at 7 a.m. on August 3rd a start was made for Cortina d'Ampezzo, some eighteen miles distant. At one point of view, the serrated Cristallo looked so grand in the distance, that the carriage was stopped, and plate No. 1 was exposed. The operation of unstrapping, fixing, exposing, and re-strapping, generally occupied, I found, about ten minutes. The sun was bright with fleecy clouds flying before the wind, so quickest exposure was given. This negative was one of the best. Cortina was reached about two p.m., and here I met my two guides, the well-known and justly celebrated Santo Siorpaes and Guiseppe Ghedina di Angelo.

No photographing was done on August 4th, as most of the day was occupied in climbing the Creppa di Fermin, descending by a new route; but Tuesday, August 5th, being a day of comparative rest, five plates, Nos. 2 to 6, were exposed. No. 2 was the main street of Cortina, looking south, with a fine modern campanile on the right side of the picture, and the Antelao in the distance. The houses are somewhat Italian in character, and not being built in straight lines, a great charm is added to the scene by the variety of picturesque gable ends, outside staircases, and general irregularity of outline and perspective.

There being no clouds at the time, the lights and shadows were very distinct. This negative was, to a certain extent, marred through over-exposure, though the shutter was used. No. 3 was the same street, but looking north; a better negative, but slightly disfigured in consequence of wrong side of plate being exposed, the view, of course, being reversed. My guides were anxious to be taken by "die kleine maschine," as they called the camera, so plates 3 and 4 were devoted to them, with the Cristallo for a background. This was at 3.30 p.m., and everything was glaring in the hot sunshine, so over-exposure had again to be recorded, and one negative had to be intensified to obtain anything like a satisfactory result. A picturesque washing fountain near the hotel was next operated upon, in the presence of a brother photographer from Bozen, who had never seen a dry plate, and was evidently lost in amazement at the shortness of time necessary in their exposure.

This finished my first six plates and the day's photographing. The room in which I was located, at the Aquila Nera, was at the top of the house, with several windows. Fortunately, they all possessed shutters, which, when closed, effectually shut out all light, and enabled me to change my plates in comfort, and with a feeling of security and satisfaction.

On August 6th, we made the first ascent of the N.W. Peak of the Cristallo, Ghedina carrying the apparatus in his sack, in this case without the leather case. When once started on the rocky W. face of the mountain, no room was found to plant the tripod with ease, but an attempt was made to take the Final Peak from a platform of rock, a short distance below the summit, a little over 10,000 feet high, which, unfortunately, resulted only in "fog." On the way back to Cortina, however, and just after a sharp shower, another attempt was made, and, on the whole, the best negative of the trip obtained. The sun shone out brilliantly after the rain, and every light and shadow on the rocky Cristallo was clearly displayed, two wooded spurs of rock forming an effective middle distance. Lake Alleghe, between Caprile and Agordo, was the next subject chosen. At the time it was unfortunately cloudy and dull, and the only case of under-exposure had to be recorded.

Agordo was reached about 5·30 p.m., and the picturesque church looking on to the central square was taken about 6 p.m., the operation being watched by about thirty Italian children of all ages, who were very much interested in the proceeding.

August 8th was spent in walking from Agordo to Val Asinozza, where the night was passed sleeping, or, in my own case, rather, trying to do so, under a huge rock at an elevation of over 7,000 feet, the bare ground serving for a bed, and a stone for a pillow. The absence of rugs or any other covering, and the presence of a wood fire which burned me in front, and a too, too cold wind which froze me at the back, made the situation the reverse of æsthetic, and for the time I felt that my "lot was not a happy one."

On August 9th, having left our sleeping quarters at 5 a.m. for an attack upon the Sasso di Mur from the N.E. side, about 8 a.m. two plates were devoted to the fissured and rocky final peak of the mountain with fairly good results, which is more than can be said of our attempt to reach the summit, which only resulted in failure. San Martino di Castrozza, an old-fashioned hostelry, formerly a monastery, finely situated at the head of Val Primiero, at the base of the Cimon della Pala, was reached the same evening, and good living and clean sheets were very much appreciated after the experience of the preceding days and night.

Plates Nos. 13 and 14 were exposed on the summit of the Cima Tognazzi, a party of friends and guides, grouped on the rocks forming the top of the mountain, being the subject. These were spoilt through the presence of dust on the plates, no doubt lodged during the process of changing at Agordo, when the only place at all suitable that could be found was a dirty sort of hole at the head of the first flight of stairs.

On August 10th a start was effected at 4 a.m., as we were bound for the Cimon della Pala, to reach the top of which seven hours of steady work is required, when San Martino is the starting point. The tripod was left behind when about half way up, the guide objecting, and naturally so, to carrry it up the last two thousand feet. The summit was gained at 11 a.m., and balancing the camera with some little difficulty on the cairn which adorns the final peak, a negative No. 14½ was obtained with fair success, but slightly over-exposed, owing, no doubt, in great measure, to the clearness of the air at such a height as 11,000 feet.

August 12, 13, and 14 were spent in making our way from San Martino to Spondinning, and climbing over the Stelvio to Switzerland.

Grindelwald was reached, and after delaying two days for fine weather, a start was made for the inn on the summit of the Little Scheidegg, our intention being to make the ascent of the Eiger (13,000) if possible the following day. The weather was all in our favour this time, and the morning star shone out clearly, and with a lustre not seen in our English atmosphere, as we started from the hotel at 3·30 a.m. The tripod was left behind, as the rocks of the Eiger are sometimes in a nasty icy condition. After the usual halt for breakfast, and for the adjustment of the rope, the summit was reached about 11 a.m., and a most magnificent view rewarded us for our seven hours' toiling. Almer distinguished himself by cutting between three and four hundred steps without a rest on the final ice-slopes. After descending about 2,000 feet, the camera was placed on a wall of rock and directed at the Jungfrau, which rose grandly to the south of us, and a good negative was obtained. The hotel was reached again about 4 p.m. Two exposures (Nos. 20 and 21) were given: the guides with their ropes and ice-axes in the foreground, and the pyramidal Eiger in the

background. The sun was shining full on to the W. face of the mountain, bringing out the lights and shadows very clearly, the occasional patches of pure snow giving relief to the picture. Both negatives were successful. A return to Grindelwald was made in the evening, and thence I travelled home by Bale and Paris.

I made the following resolutions for guidance in future expeditions :—

1. *Always* change plates at night; never allow laziness or fatigue after a hard day's work to interfere with this rule.

2. Carefully avoid raising any dust when closing apertures with old bags or other such material.

3. Carry plates of various degrees of speed.

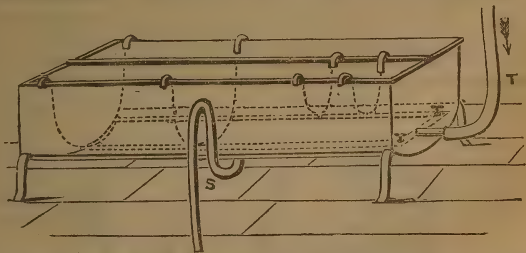
Summing up in brief the results of the tour, the record stands thus:— Exposures, 28; successes, 18; moderate successes, 6; failures, 4.

TWO NEW APPARATUS FOR WASHING GELATINO-BROMIDE PLATES.

BY DR. H. FOL, OF THE UNIVERSITY OF GENEVA.

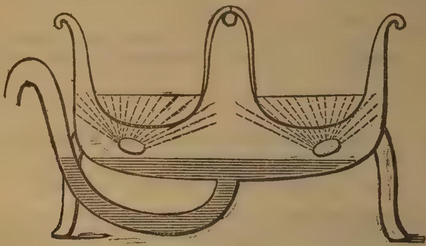
In order to get permanent results with the gelatino-bromide process, and to obtain negatives capable of being intensified without running the risk of spotting, the plates must be submitted to very prolonged washing; this constitutes one of the great disadvantages of this process, as compared with collodion. My object has been to make the operation of washing perfectly automatic, so as to avoid loss of time; and I think it will be seen that I have been successful.

The first apparatus to which I desire to draw attention is a vessel in



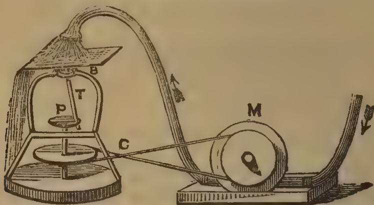
which plates can be rinsed after issuing from the hyposulphite bath. This apparatus is made entirely of tinned copper, and consists of a cistern in the form of an elongated rectangle, curved at the bottom in the shape of a gutter, and resting on four legs. Inside, along the bottom, there are fixed two tubes, pierced on their upper surface with a large number of very fine holes. The water is conveyed to these tubes by the pipe, T, and spouts upwards in a fine rain. Gradually the cistern gets filled, and the water, as it rises, is kept in continual agitation by the pressure of that issuing from the fine holes. When the cistern is nearly full, the siphon, S, made of a large-bore pipe, comes into action, and the cistern is emptied in about a minute; this alternating action of filling and emptying goes on automatically, without needing any

attention. As they are taken from the hyposulphite bath, the plates are placed in the cistern with the film side downwards ; to hold them, bent iron wires covered with caoutchouc tubing are hung from the sides of the cistern. These wires are doubled into hooks at the ends, and the middle is bent round like the ribs of a ship, so that the plates come into contact with them only at their extreme edges. For smaller plates I use shorter wires, which are suspended at one end from the edge of the cistern, and at the other from a movable rod running along the length of the cistern (see the figure).



An apparatus for washing plates has been for some time on sale in England, but in this, the plates are placed in a vertical position, and the water reaches them from above the cistern. The consequence of this arrangement is that the gelatine film is very unequally washed, and that the water which collects at the bottom of the cistern is not kept in motion. My model, which I have had constructed here in Geneva, obviates all these disadvantages, and acts to perfection. It washes the plates very briskly, and never injures the film.

After an hour of this washing, the plates are fixed, and then passed into an alum bath, after which they are again washed for five minutes by means of my second apparatus, which I will now describe. The water is brought at a



pressure of about one atmospheric through one of those elegant hydraulic engines manufactured by Messrs. Schmidt and Co., of Zurich. It sets this engine in motion, and then, passing through an india-rubber tube terminated by a rose, falls upon the plate in a fine rain. The motion of the engine, M, is communicated by an endless cord to a wheel on which, by means of the pivot, P, is supported a disc pierced with a number of holes. Fitting in one of these holes is a rod, T, which is compelled to move with the disc, but without revolving on itself ; it is, in fact, articulated at B by means of a double joint like that used for suspending lamps on board ship. At the other end of the rod, T, are a couple of hooks, moving in grooves to which the plate to be

washed is attached. Observe that the plate does not turn on its axis; it is merely inclined successively in every direction, and it will be noticed that the water always falls on the part of the plate above its centre, to run off at the opposite corner. The chief force of the jet never attacks the same part of the plate for two seconds successively, and, for this reason, a plate whose film has partially separated from the glass can be left for half-an-hour under a brisk stream of water without the evil being aggravated. It seems scarcely possible to restrain a laugh when seeing this apparatus in action, and imitating so perfectly the motion of the photographer's hand in washing a plate under the tap, although effecting its purpose with much greater completeness. Another advantage of this abundant rinsing is that it removes the opalescent fog which plates sometimes have on being taken out of the alum bath. Only since I have had these apparatus for washing have I been able to work the gelatino-bromide process really expeditiously.

A GOOD MOUNTING SOLUTION.

BY BAYNHAM JONES.

There is no greater requirement in photography than a good mounting solution. I have tried scores of them, but all have been found wanting. Now it has occurred to me that if it were possible to get the backs of prints gummed in a similar way to postage stamps, we might exclaim, Eureka! All that would be requisite would be to lay the print, gummed side downwards, on a sheet of damp blotting-paper, and then transfer it to your album, without fear of cockling, as the moisture would be confined to the surface of the gum and would not affect the print. Now the question is, how is this to be done?

I wrote some time since to Messrs. De La Rue, who manufacture the postage stamps, for information on this point, and their reply was that it requires expensive machinery, and not available for amateurs. My notion is that the gum is applied by means of rollers which need not be costly; but should I be mistaken, might it not answer the purpose of any enterprising man to set up the necessary machinery, and apply the gum to prints sent for that purpose, at so much per dozen, according to size?

"A nod is as good as a wink to a blind horse," and the publication of this hint may induce some one to try the experiment.

GELATINE-PLATE COATING.

BY B. WYLES.

Most of the instructions given for spreading gelatine emulsion speak of pouring out of the stock receptacles the due quantity into a measure, and then pouring it on to the levelled plates. Early in my own experience I came to the conclusion that this was a slow and cumbrous plan, and devised a little piece of apparatus which has served me well ever since.

This appliance consists of a glass-holder for the emulsion, terminating in a flexible tube, with a clip at the end. The glass-holder has an

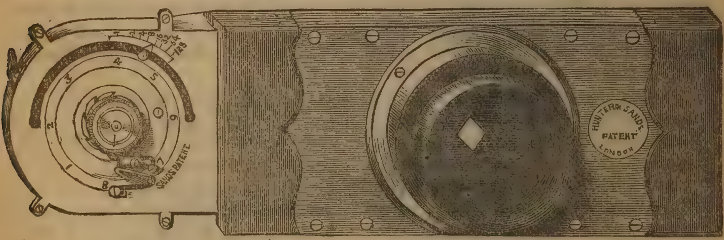
outer jacket of metal, so that the emulsion is kept fluid with warm water, which fills the space between the glass and metal case.

The glass is simply a large paraffin-lamp chimney, stoppered at the bottom with a turned piece of box-wood through which a hole is pierced; the tube is attached to this.

In practice, the holder is suspended over the plate-glass slab, and, with clip in left hand and glass rod in the right, the plates are very quickly covered. No necessity exists for *measuring* (with practice it comes quite easy to adjust the quantity required); it is far more important to give attention to the *equal distribution* of the emulsion over the plates, and to give *enough*. Many of the commercial plates are sadly too thin, and this, perhaps, largely accounts for the idea that gelatino-bromide is not favourable to density. Brilliancy *may* be got on gelatine, but not on thin plates.

MESSRS. HUNTER AND SAND'S SHUTTER.

In this apparatus the principle of two perforated slides crossing each other at equal speed in opposite directions is adopted; the openings in the screens being diamond-shaped. Both slides are moved at the same time, but in contrary directions, by means of a revolving disc mounted at one end of the frame work, each slide being coupled to an opposite



point of this disc by means of a separate connecting rod. The disc is so arranged that it can only be turned through half a circle; the shutter being closed when the disc is either extreme of its range, and being wide open when the disc is in an intermediate position, so that moderate or long exposures may be given by turning the disc with the hand. In order, however, to adapt the instrument to rapid work, a small spiral spring is attached to the axis of the disc, and by varying the tension of this spring the force with which the disc tends to rotate—say towards the right—can be altered. A detent which can hold the disc against the tension of the spring forms the trigger of the apparatus, there being one notch in the disc corresponding to full-cock, and another corresponding to half-cock. The variable tension of the spring renders it possible to regulate exposures from one-fifth to a hundred and fiftieth of a second.

Gelatino-Bromide in a Nutshell.

PREPARATION OF THE GLASS.

After the plates have been carefully cleaned, the following formula may be used as a preliminary coating—

Soluble silicate	... ...	1 part
Solution of albumen	... ...	5 parts

the albumen solution being prepared by mixing the white of one egg beaten to snow with three pints of water. One must be careful to purchase genuine silicate of soda or potash.

Dr. Vogel recommends a very useful substratum, consisting of a solution of gelatine in acetic acid, and thinned down with methylated spirit.

CHOICE OF GELATINE.

The following points are recommended, to which attention should be directed in choosing a gelatine for emulsion processes :—

1. When ammonia is not to be used, the gelatine should have an acid reaction. When ammonia is used, this is a matter of indifference.

2. The sort of gelatine preferred is that which gives the clearest and hardest jelly, and soaks up very little water. It must be free from fat, otherwise there will be a depression in the film, and bright spots, with blurred outlines, in the negative. A gelatine of this kind may be employed, if ammonia is added; in this case, the fat is saponified, and the spots will disappear. Nelson's No. 1, No. 2, and the opaque, are all alkaline, and give a somewhat turbid jelly. Number 1 is the softest, and the opaque the hardest. Coignet's "gold medal" and "French gelatine" give much clearer and harder jellies, but have an acid reaction, and are liable to contain fatty matter. Henderson's gelatine, which has been recently introduced, is highly spoken of by many.

DR. EDER'S FORMULÆ FOR GELATINE EMULSIONS.

The following formulæ are recommended by Dr. Eder for the preparation of very sensitive gelatine emulsions. Full particulars are to be found in "Modern Dry Plates," the English edition of Dr. Eder's work.

No 1.

Bromide of potassium ...	... 4 grammes	Swell and dissolve at a temperature of 35° to 40° C. (95° to 104° F.)
Gelatine	7½ to 8 „	
Water	... 50 cub. cents.	
Nitrate of silver... ...	... 5 grammes	
Water	... 50 cub. cents.	

Dissolve the silver in the water, and precipitate it with ammonia; continue the addition of ammonia, a few drops at a time, until the brown oxide of silver re-dissolves, and the liquid looks as bright as pure water. The strength of the ammonia is immaterial; a strong ammonia requires a few drops less; sufficient should be put in to obtain the desired effect.

The nitrate of silver solution may be warmed to 35° (93° F.).

Pour the silver into the bromized gelatine a little at a time, continually stirring with a glass rod. Rinse the silver bottle with ten cub. cents. of water, and add this to the emulsion.

Place the bottle containing the emulsion now in a basin or saucepan with water to 35° C. ; leave it therein for fifteen to thirty minutes. The basin must not be heated during this time, but contain sufficient water so that the temperature does not fall too much; even when the heat drops to 25° C. (77° F.), no harm will be done.

After thirty minutes the emulsion is ready, and is to be poured into a shallow dish to set and be washed.

Caution.—This emulsion never fogs, but it is *conditio sine qua non*, that in no part of the progress the temperature should exceed 40° C., and it is a safe rule not to go beyond 35° C. (93° F.) In cool weather, Nelson's No. 1 may be used; but as this kind refuses to set during the heat of the summer months, I then use French gelatine, which is cheap and excellent.

No. 2.

Bromide of potassium	4 grammes
Gelatine	7½ "
Water	50 cub. cents.

The bromide of potassium must be pure, and *not* alkaline. The gelatine may also *not* have an alkaline reaction.

The bromized gelatine must be melted at 60° to 70° C. (140° to 158° F.), and then emulsified by the addition of five grammes nitrate of silver dissolved in fifty cub. cents. of water. The silver solution may also be warmed to the same temperature as the gelatine, but this is immaterial. The silver bottle is rinsed with ten cub. cents. of water, and this added to the emulsion.

The bottle, with the emulsion, is now put in a saucepan with hot water; the saucepan covered with a lid to exclude light, and the water in the saucepan set boiling by the flame of a gas or petroleum lamp. The boiling should be continued for twenty-five to thirty minutes; the flame is then extinguished, and *both* water and emulsion cooled down to 37° and 35° C. (98° and 93° F.). Then, but only then, two cub. cents. of ammonia are added and stirred through the emulsion, which is left for another thirty or sixty minutes in the water bath of 93° F. It is now taken out, poured in a dish to set, &c.

Both methods are excellent, and simplicity itself. There is no great difference in the sensitiveness, but Dr. Eder claims for the second method a greater rapidity of at least one-fifth, and observes that the negatives by the second method are specially suited for portraits wanted very soft, and full of detail; whilst at the same time the oxalate developer may be made to develop a pure black whenever required.

PAGET PRIZE PROCESS.

Mr. W. J. Wilson, who gained the Paget prize for the best emulsion process, prepares the latter as follows:—

No. 1.

Hydrochloric acid (pure)	1 fluid drachm
Distilled water	12½ ounces

No. 2.

Distilled water	3 ounces
Ammonium bromide	210 grains
Nelson's No. 1 gelatine	80 ,,

Twenty minims of the No. 1 solution are introduced into the whole of the No. 2 solution, and the gelatine left to swell. In another glass vessel, 330 grains of silver nitrate are dissolved in three ounces of distilled water. A small quantity, about two fluid drachms, of the latter is poured into a test-tube, and diluted with an equal bulk of distilled water. The solution of the bromised gelatine is then rendered complete by immersing the bottle in hot water, and the dilute silver nitrate is added, all at once. The bottle is then shaken, and the remainder of the strong silver solution added in quantities of half-an-ounce at a time, shaking, as before, after each addition. The emulsion is then boiled for fifty-five minutes, and, when cooled down to 90° Fah., one ounce of Nelson's No. 1 gelatine or the X opaque, which has been previously swelled and dissolved in water, so as to measure four ounces, is added. When set, the emulsion is squeezed through canvas into a pan containing three ounces of a saturated solution of potassium bichromate in three pints of cold water, and allowed to remain in it for one hour. The emulsion is then squeezed through canvas into clean cold water, and the operation repeated immediately, the emulsion remaining in the last wash-water for half-an-hour. The addition of two ounces of alcohol and sufficient water to make up solution to twenty ounces, complete the process, and the emulsion, when filtered, is ready for use.

MR. BEDFORD'S PROCESS.

Mr. Bedford employs, for heating, an Argand gas-burner, or petroleum lamp provided with a deep ruby chimney, further screened with paper stained with aurine. The formulæ for ten ounces of emulsion will stand thus:—

No. 1.

French gelatine	20 grains
Ammonium bromide	110 ,,
Potassium iodide	10 ,,
Ammonia, ·880 sp. gr.	2 minims
Water	2 ounces

No. 2.

Silver nitrate	200 grains
Distilled water	2 ounces

The gelatine must be soaked in the two ounces of water in which the bromide and iodide are dissolved. Both solutions are then heated to 150° Fahr., and No. 2 is added very gradually to No. 1 through a small glass funnel, while the vessel containing the bromized gelatine must be briskly agitated, for which purpose Mr. Bedford uses a bottle brush made with silver wire. When the whole silver solution has been added, a small quantity of the emulsion may be poured on a slip of glass, and examined by the transmitted light of a gas-flame; if the flame appears of an orange-yellow colour, the emulsion will have been properly mixed; but if of a cold grey or blue tint at this stage, it shows that the operation has been too hurriedly performed, and the result will not be satisfactory. The emulsion may now be transferred to a stoneware bottle placed in a saucepan of boiling water to be kept boiling for thirty minutes. It is then

strengthened up by the addition of 250 grains more gelatine (previously soaked in water and drained), and filtered into a dish to set. Mr. Bedford finds Nelson's photographic gelatine too soluble, unless mixed with a firmer kind, such as Coignet's "Gold Medal." When thoroughly set, the pellicle is broken up into pieces, and passed through a syringe, having a disc at the end pierced with holes, into a hair sieve standing in a vessel of running water, for six hours.

The washed emulsion having been re-melted, and filtered through swandown calico, the plates may be coated without warming; the addition of alcohol is unnecessary, unless the emulsion has to be kept before use; but in any case it is best used fresh.

Heating the plates during the drying process renders them liable to frill during development, unless a small proportion of chrome alum, two drops of a sixteen-grain solution to each ounce of the washed emulsion, is added previous to coating.

DR. LOHSE'S METHOD OF PREPARING PURE BROMIDE OF SILVER WITHOUT WASHING.

It is advisable, in framing a formula, to set down the proportions thus :—

Potassic bromide	125 grains
Silver nitrate	170 „

Take one ounce of distilled water, add to it Nelson's No. 1 photo-gelatine, fifteen grains. In this dissolve the potassic bromide, and, after allowing the gelatine to swell, dissolve by heat at about 140° Fahr. When the solution is effected, introduce the silver nitrate in crystals, and dissolve. Now boil for twenty minutes, or for an hour if extreme rapidity is desired. It is of course necessary to conduct the operations under a chemically inert light from the stage when the silver bromide is formed. After boiling, add to the solution acetic acid (glacial) slightly in excess of the quantity required to dissolve the gelatine. The emulsion thus formed should be made up to a pint with distilled water, and allowed to settle for three or four days. At the end of that time it will be found that the silver bromide has settled down into a compact mass at the bottom of the jar. The water may now be drawn off by means of a syphon, so as not to disturb the sediment.

We recommend that the silver bromide should be again diluted with water, and allowed to settle. This second precipitation removes any trace left of free salts, and should be carried out when the emulsion or plates are to be kept for a length of time.

The silver bromide may be dried finally, and stored in light-tight bottles ready for use. After the second washing, add to the emulsion dilute ammonia, drop by drop, and test with litmus paper until all trace of acid is removed. The emulsion should now be made up for use by adding

Gelatine	150 grains
Water	5½ ounces

Complete mixture must be established by vigorously shaking the bottle containing the ingredients. The emulsion should finally be filtered, and plates coated in the ordinary way.

MR. JARMAN'S MODE OF PROCEEDING (see page 137).

COLLODIO-GELATINE EMULSIONS.

DR. VOGEL says:—

1. I first produce a gelatine emulsion according to the customary process, which is then dried by means of cold or warm air, or other means for extracting the water. The dry gelatino-bromide of silver—which can also contain iodide of silver and chloride of silver—I then dissolve warm in one of the above-mentioned acids, using three to ten times as much, or even more, acid. The quantity of acid to be used depends on the solvency of the gelatine, and must be tried for each kind. This acidulous emulsion is now used alone, after having been diluted with alcohol to the required consistency, or it can be mixed with pyroxyline. The pyroxyline is dissolved in acetic or any similar acid, or a mixture of such acid with alcohol. The most appropriate quantity of pyroxyline is about 1 per cent. of the quantity of acidulous emulsion employed. Instead of this process, the following method can be used:—

2. Pyroxyline is dissolved in one of the fatty acids—for instance, formic or acetic acid, or a mixture of such acid *per se*, or with alcohol, or other solvent which will dissolve both gelatine and pyroxyline. For easily soluble pyroxyline, alcohol or methylated spirit, or a mixture of the same, can be used as solvent. The proportions can be varied in many different ways, so that the following formula serves simply as an example, *id est*:—

Pyroxyline	2 grammes
Acetic acid	50 ,,
Alcohol	50 ,,

The collodion produced by this process is mixed with about an equal quantity of acidulous emulsion, as above described. The gelatine emulsion collodion produced can be slightly warmed, and applied like ordinary collodion to glass plates, paper, &c., and exposed to the light either in a moist or dry condition. A similar mixture can be prepared as follows:—

3. A collodion emulsion is prepared according to the customary formula, and precipitated as usual by water; or the emulsion is allowed to dry up, then washed, and the dry matter dissolved in one of the above-mentioned acids or mixtures of the same with alcohol. Gelatine, either alone or after being dissolved in one of the solvents mentioned above, is now added to the collodion preparation. The proportions can be varied in the like degree as in the preparation of the collodion emulsion. The following is, for instance, one of the various proportions of the mixture:—7 grammes of the precipitated pyroxyline containing bromide of silver are dissolved in 150 grammes alcohol and 90 grammes acetic acid; then 2 grammes gelatine are dissolved in 20 grammes acetic acid, and added to the same. Another process for producing a similar mixture is:—

4. Dissolve gelatine and pyroxyline in one of the above-mentioned solvents, or dissolve them separately, and then mix the solutions. Finely-powdered bromide of silver prepared in the customary manner, or any one of the silver haloid salts, or a mixture of the same, is now added to the gelatine-collodion solution; or the silver haloid salts are produced in the gelatine-collodion solution through double decomposition. These proportions can also be varied in different ways.

M. Konarzewski gives the formula of a gelatine and gun-cotton emulsion:—

Alcohol at 36°	50 c.c.
Glacial acetic acid	50 c.c.
Gun-cotton	1 gr.

To this collodion 10 gr. of dry gelatine emulsion are added, and dissolved by aid of the water bath. The emulsion has a tendency to slip off the plate, but this is entirely obviated by employing a substratum of albumen and silicate of soda.

BOILING THE EMULSION.

Dr. Eder makes the following remarks on this subject:—

1. When gelatine is boiled for a long time, it splits up into two substances—semi-glutin and hemi-collin; the former reduces silver nitrate without precipitating it; the latter produces a curdy-white precipitate of silver nitrate. This splitting up of the gelatine, after long boiling, is the cause of gelatine being unable to set.

2. If the mass be kept for a long time at a temperature of 30° to 50° C., the gelatine becomes equally incapable of setting; but at a later period than in the former case.

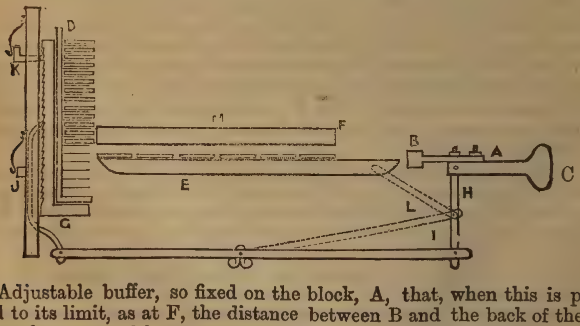
3. Boiling with even a slight addition of ammonia, or of an acid, quickly deprives gelatine of its power of setting, and the same splitting-up appears to occur.

4. The incapability of setting produced by continued heating at 30° to 50° C. is almost always the result of a process of decomposition. Germs of putrefaction are always present in the atmosphere, so that no artificial ferment is necessary.

Applied to a glass, and examined by transmitted light, the most sensitive emulsion appears of a *blue-violet* or *blue-grey*.

MESSRS. COBB AND COWAN'S MACHINE FOR LEVELLING AND RACKING PLATES.

A. Block of wood working horizontally in guides, C being a pushing-piece for the hand of the worker. The return motion towards C is effected by springs not shown in the cut.



B. Adjustable buffer, so fixed on the block, A, that, when this is pushed forward to its limit, as at F, the distance between B and the back of the rack, D, is exactly measured by an ascertained number of the plates which are to be coated.

E. One of a pair of planed and levelled strips of iron, on which the plates ride forward towards the rack. Adjustable side pieces prevent any plates working out of a direct line while being pushed along the strips, E.

G. A carriage or support for the plate racks, this being raised one degree each time the block, A, is drawn back by its springs; the action of levers, H, I, and the lifting-piece, J, being made sufficiently clear by the diagram. The detent, K, serves to prevent the return of the carriage during the downward motion of J. When a fresh rack is placed on the carriage, G, the detents, K and J, are drawn back by hand. The dotted lines at L show the position of the lever, H, and part of I, when the sliding block, A, is in its most forward position.

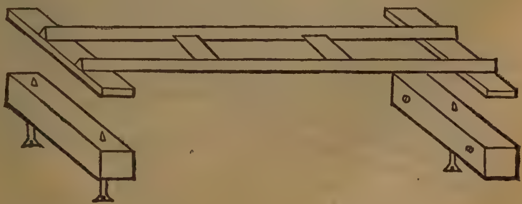
M. A metal box which may serve as a cover in cool weather, or as an ice-box in hot weather, so that the emulsion shall become set before the plates reach the rack. In actual practice, the bed, E, would be ten or twelve feet long, so that one end of the machine could be in the coating-room, and the other end in the drying-room.

D. One of a set of movable racks, formed with light shelves or projections to take the plates. The length of these projections will vary according to the size of the plate to be coated; but when small plates are being operated on, the rack must be placed more forward on the carriage, and the buffer, B, must, of course, be adjusted to the required position.

To use the machine, a rack is placed in position on the carriage, this being lowered by drawing back the detents, K and J. The rails, E, are next covered with plates, and the sliding block, A, is pushed forward, this action serving to put the farthest plate on the top shelf of the rack. The springs governing A now come into action, drawing it back, and, at the same time, raising the rack-carriage one degree, while a space is left for the next plate between F and B. The same series of actions are repeated until the rack is full, a circumstance which is announced by the ringing of a bell, when the full rack is taken to the drying-room, and a fresh one placed on the carriage of the machine.

MR. BEDFORD'S DRYING CLOSET.

The closet is constructed to contain three dozen 10 by 8 plates, or an equivalent number of smaller sizes, the inside dimensions being: height, thirty-eight inches; width, twenty-nine inches; and depth, front to back, fourteen inches; and there is attached to the bottom a galvanized iron trough, through which the supply of fresh air passes, a Bunsen burner being lighted beneath it in cold

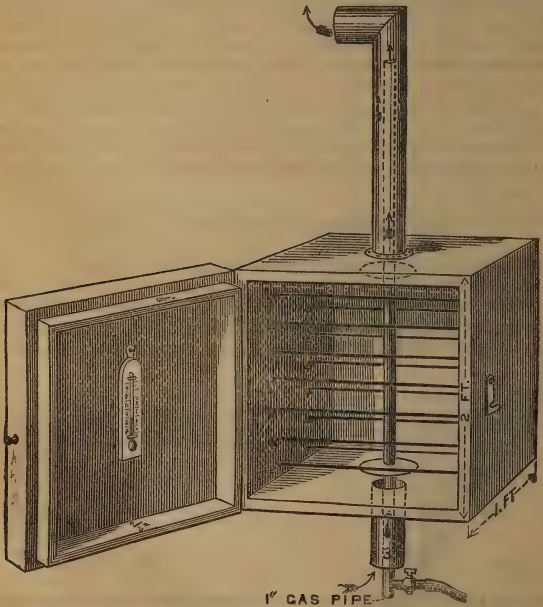


weather; and the outlet at the top is connected with about four feet of three-inch pipe, in which another burner can be lighted to stimulate the draught of air through the whole.

The special feature in this closet is the series of shelves, twelve in number, which are so contrived that they may be separately levelled with great precision. To this end each shelf consists of a light iron casting in the form of two parallel bars, five inches apart, joined by cross-pieces at each end, and accurately planed on the narrow top edges, where the plates will rest while drying. In order to counteract any tendency to spring while under the action of the tool in the process of planing, there are likewise two intermediate cross-pieces. The shelves, with the exception of the lowest, which rests on the bottom, are supported, at a distance of three inches apart, on the points of ordinary wood-screws passing through wooden cleats, which are firmly screwed to the sides of the closet. There are two screws at one end, and one at the other, for each casting to rest on; it is then easy, with the aid of a pair of gas pliers, to accurately adjust the level of each shelf separately, so that the emulsion will set and dry in an even film.

MR. ENGLAND'S DRYING-BOX.

The box is nothing more nor less than a light-tight cupboard, with wires stretched across to support the plates. Through the centre runs an inch gas-pipe, open at both ends, at the bottom of which is a small gas jet which burns



inside. At the top and bottom of the box are two draught-holes cut, to which a tin tubing of about three inches diameter is attached, as shown in the figure.

The gas tube gets warmed with a very small jet of gas burning in it, a mere pin-hole being sufficient exit for the gas. This warms the air in contact with the tin tube, and also slightly the air inside the cupboard. The consequence is, that a current of slightly warm air is set up, and circulates amongst the plates while supported on the wires, and the drying of the films takes place rapidly. Five or six hours is a sufficient time in which to dry the plates, whilst without the gas jet it would take twenty-four hours or more. In the inside of the cupboard, and near the top and bottom, are placed two cardboard discs to stop the possibility of any stray light entering, and, as the whole affair is placed in the dark room, the chances of any such access, even without it, would be small.

Inside the cupboard door is fixed a thermometer, and the jet is regulated so that a temperature of about 70° is indicated—80° would do no harm to the plates; beyond that temperature it might not be safe to go.

The small gas jet used is the same as may be seen in tobacconists' shops; the hole in the end is plugged up, and a very small hole drilled at the side.

DEVELOPERS.

SEE Standard Formulæ, page 193; and also Dr. Eder's article, page 36.

MR. COWELL'S FORMULA FOR CLEARING GELATINE PLATES.

Citric acid	2 ounces
Alum...	1 ounce
Water	10 ounces

This can be kept as a stock solution, and diluted about two-thirds to form a bath for immersing gelatine negatives.

INTENSIFIERS.

SEE Standard Formulæ, page 193.

MR. JARMAN'S FORMULA FOR PREVENTION OF FRILLING.

MR. JARMAN'S formula is as follows:—

Tannic acid	5 grains
Alcohol	1 ounce

When the tannic acid is completely dissolved, 40 minims of the solution are added to every 20 ounces of the emulsion, and the whole vigorously stirred. This will be found to give a complete immunity from frilling.

MR. VALENTINE BLANCHARD'S REDUCER.

A SATURATED solution of alum, in which the negative is allowed to remain until the desired reduction has taken place. This method is only applicable to negatives developed with pyrogallic acid.

HOLMES' OZONE BLEACH.

When diluted with from three to eight parts of water, the bleach is very effective as a reducer. It must be carefully used, as its action is very rapid.

MR. BEDFORD'S METHOD OF ELIMINATING GREEN FOG.

The negative is immersed in a solution of crystallized potassium cyanide and iodine.

DR. EDER'S PLAN OF TREATING FOGGY GELATINE PLATES.

A filtered solution is prepared of—

Ferricyanide of potassium	10 parts
Bromide of potassium or of ammonium	10 „
Water	100 „

The foggy gelatine plates are immersed for from ten to fifteen minutes. They are then rinsed, and put into water (changed at frequent intervals) for two or three hours, to wash them thoroughly. The ferricyanide solution will keep well if stored in stoppered bottles away from daylight.

DR. EDER'S METHOD OF INCREASING THE SENSITIVENESS OF GELATINE PLATES.

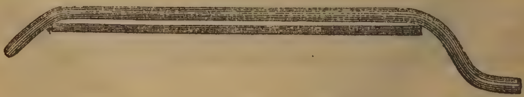
The plates are immersed in the following solution:—

Citric acid	10 parts
Silver nitrate...	10 „
Water	100 „

To this mixture is added from 100 to 200 parts of alcohol. If the emulsion has not been sufficiently washed, this solution will be found too weak, and it is necessary to add twice as much silver nitrate to the alcohol in order to produce the desired effect.

COATING GELATINE PLATES.

Colonel Dawson, C.B., suggests the following plan for those who coat their own plates:—Take a glass rod, and over a lamp bend it at both ends the width



of the plate, leaving the middle part straight. A gap will remain between the rod and the plate. Pour the emulsion on to the plate, and pass the rod through the fluid; run it along from end to end, tilting the plate to make the emulsion follow.

DEFECTS AND REMEDIES.

(1.) Defects in the Emulsion.

(A.)—When the gelatine emulsion is flowed over a glass plate, and does not set for a long time, though the temperature of the air and of the plate is not very high, place the plate upon a cold metal or stone slab (10° C.) If that produce no effect, the emulsion has been spoiled, either by continued cooking at a great heat (60° to 100° C.), or by repeated melting and solidifying, the latter being specially injurious when the gelatine is of inferior quality. For this reason it is better not to keep the stock of gelatine emulsion warm, but to plunge the flask at once into cold water. When gelatine is heated continuously for a long time with ammonia, it loses its property of solidifying; and the same happens to an emulsion digested with more than five per cent. of ammonia. The best means to put it right again is to add about half its quantity of the original gelatine. By long keeping the gelatine will often putrefy, and then it becomes fluid of its own accord, and loses the power of solidifying. This can be prevented by adding from 1 to 2 per cent. of salicylic acid, or of thymol dissolved in 5 cub. cents. of alcohol for every 100 cub. cents. of gelatine.

(B).—Separation of the film from the glass during development, formation of bubbles, protrusion of the layer of gelatine over the edge of the plate, production of creases, distortion and tearing of the negative image. All these defects are due to the employment of too soft a gelatine; by using a collotype gelatine they may be avoided. The same effect is produced when the emulsion contains a considerable amount of gum-arabic. It may be cured by cleaning the glass with a weak solution (1 : 200) of soluble glass, which causes the gelatine to adhere more firmly; coating the edges of the plates with a varnish of caoutchouc is also a remedy. A complete cure is obtained by, previous to developing, dipping the plates for about five minutes in a saturated solution of alum in water, followed by a thorough rinsing. According to Chardon, it suffices only to dip the plates in alcohol, and to develop afterwards.

(C).—Light-coloured spots without any sharp outline in the negative may be attributed to some fatty substance in the gelatine; the spots may be got rid of, and the silver bromide plates rendered homogeneous, by filtering the gelatine several times through filter paper.

(D).—Fogging invariably makes its appearance when the emulsion is prepared with an excess of silver nitrate. Many kinds of gelatine are liable to give fog when they have an alkaline reaction. Fogging is also caused by continuous digesting at too high a temperature, by the addition of too much ammonia, or by too long or too great heating with the same substance. It may be cured by adding bromide of potassium or a few drops of the tincture of iodine. Emulsions which are inclined to fog are best cured by being washed, first with a dilute solution of bichromate, and then with water.

Due attention must be paid to the mixing of the ingredients in the required proportions, and at the proper temperature. By the addition of ten per cent. of alcohol the bromide of silver is brought to a pale condition. In employing bromide of potassium it must be chemically pure; by using it in excess of the silver, a much more sensitive emulsion ensues. As to the quantity of gelatine in the more fluid emulsions, the bromide of silver is granulous and green, and, unless care be taken, likely to separate out, while with a larger amount of gelatine it is finer and paler. With regard to the quality of gelatines, those of Nelson's are the purest, although not so firm as others—Swinburne's, and those of French and German manufacture, for instance. Imperfect washing often

gives hard, impure negatives, while thorough and continuous washing greatly improves the emulsion.—*Monckhoven.*

(2).—Defects in Plates, etc.

Spots may generally be discovered by passing the finger softly over surface.

Local *intensification* may be given by applying a saturated solution of bichloride of mercury with a brush to the parts requiring it, and local reduction may be obtained in the same way, substituting potassium cyanide for mercury salt.

White points or round spots with a sharp outline, which, after fixing, have a glassy appearance, are caused by air-bubbles adhering to the plate, and preventing the developer from penetrating. These bubbles may be avoided by rinsing the plates with water before development, or by a gentle movement of the pan during the same. They can also be removed by a camel's-hair brush at the same time.

Irregular lines and spots make their appearance when there is too little developing solution flowed over the plate, so that portions only are covered. In this case also, if the plate be previously moistened with water, a less quantity of developer wlll be required.

Defects in Developing.—Should the negative not develop vigorously, the development is forced by increasing the proportion of ammonia, or sometimes that of pyrogallic acid. Though promoting the appearance of the details, this often causes fogging, the negative remaining thin and weak. It may be remedied by increasing the quantity of potassium bromide in the same ratio as that of ammonia, thus ultimately correcting defects due to errors of exposure or faults in the emulsion.

A milky veil is sometimes seen when the ferrous oxalate developer is employed. It is due to a precipitate of oxalate of lime formed by the oxalic acid of the developer coming into contact with the lime of the hard spring water in which the plates have been washed. With the pyrogallic developer this chalky precipitate does not occur, even when spring water is used, for caustic ammonia only precipitates lime after a lapse of some time. It is, however, always preferable to use distilled water for the purpose of washing—or, at least, rain water.

As a remedy against solarization, avoid as much as possible too great contrasts in the image to be produced; place the camera so that no reflection of light can penetrate the objective; do not prolong the exposure more than necessary; stop the development as soon as possible, and blacken the interior of the dark slide and the back of the plate.

Processes.

THE WET PROCESS.

Cleaning the Plate.—A clean plate can be secured by polishing, or by the use of a substratum. For polishing, use—

Iodine	1 drachm
Tripoli	3 ounces
Methylated spirit	1 pint

For a substratum, white of one egg to twenty ounces of water, and two drops

of carbolic acid, or a two-grain solution of gelatine, may be used instead, preserving with two drops of carbolic to the pint. Plates prepared with either albumen or gelatine substratum will keep for months, either in plate-boxes, or packed face to face with clean paper between.

Collodionizing.—Care is to be taken that the back and edges of the plate are freed from dirt and dust previous to coating, and that the collodion film is allowed to set well before placing in the bath. Most commercial collodions work well, especially when allowed some little time to ripen and settle after iodising; and if the superfluous collodion, instead of being drained back into the pourer, is run into another bottle, clean negatives are far more certain than otherwise.

The Silver Bath, when compounded of pure nitrate of silver and distilled water, as a rule will work well at once; but as pure distilled water is not always procurable, one of the best methods of procedure is that of Mr. Valentine Blanchard, which may be briefly summarised as follows:—For every ounce of nitrate of silver take one pint of water, and add five grains iodide of potassium (calcium has certain advantages, and is recommended in preference), and five grains of carbonate of soda, agitate thoroughly, and place in the light for a day or two; then filter, and if, upon trying a plate, a foggy image is the result, four drops of dilute nitric acid (1 to 8) are added, and the bath allowed to stand an hour or two before again trying. After each day's work, add a portion of a concentrated solution of nitrate of silver, and the bath will work well for a long time. However, in time the solution becomes contaminated with organic matter from various sources, and from the accumulation of alcohol and ether the developer does not flow nicely; it should then be turned into a bottle, and diluted with half its bulk of water, five grains of carbonate of soda added to each pint, and placed in the sun for three or four days, then either boiled down to its original strength, or made up with fresh crystals of nitrate of silver, and carefully filtered, and tested for fog; proceeding as before, if not giving clear images.

Developer.—The best and handiest method of compounding the developing solution is to keep a standard solution of the sulphate of iron.

Sulphate of iron	10 ounces
Water	20 ,,
Sulphate of copper...	1 ounce

To make a twenty-grain developer, take—

Of the above	2 ounces
Glacial acetic acid	6 drachms
Water	18 ounces

Alcohol is required.

More or less of the standard solution is used as a stronger or weaker developer is required. In the case of under-exposure, the strong solution is very handy to bring out detail and promote harmony; for over-exposure the negative should be fixed and washed, and intensified afterwards.

In photographing a subject presenting violent contrasts, the use of a strong developer will tend to promote harmony in the negative, and on a subject where the general effect is flat, a weak solution will give a brighter picture.

Intensifying.—For portrait negatives, it is rarely necessary to intensify; in fact, in some studios, a reduction of the original intensity is usually necessary, which is done, after the negative is fixed and washed, by treating, either locally

or generally, with a weak solution of perchloride of iron; wash, and flood with weak hyposulphite. If, however, intensifying is necessary, either iron and citric acid, or pyrogallic acid and citric acid, may be used, the former when only a little addition is required, the latter when more is necessary. Subjoined are the formulas:—

Pyrogallic acid	40 grains
Citric acid	20 „
Water	20 ounces

Iron Intensifier—

Sulphate of iron	1 ounce
Acetic acid...	1 „
Citric acid	$\frac{1}{2}$ „
Water	20 ounces

This solution improves with age. Each is to be used with a few drops of a thirty-grain solution of nitrate of silver.

Fixing may be accomplished in either cyanide of potassium or in hyposulphite of soda; but if the latter be used, more copious washing is required than when cyanide is used.

Varnishing.—With the many good commercial varnishes in the market, it may seem superfluous to give formula for varnish, but as an advertisement appeared in the NEWS, offering for sale a formula for making varnish, a formula published some time ago by Nelson K. Cherrill for a varnish as good as any in the market is subjoined:—Take

Gum sandarac	$\frac{3}{4}$ pound
Gum shellac	2 ounces

Place in a bottle, cover with absolute alcohol, allow to digest for two days; pour off the liquid portion into a Winchester, add more absolute alcohol, and again digest for three or four days, stirring or shaking occasionally; now add to that already in the Winchester; add one ounce of castor oil, shake well, and dilute by filling up Winchester with methylated spirit; allow to stand and settle, when as good a varnish will be the result as the most fastidious could desire.

The Silver Printing Bath.—Without doubt the best results are obtained from the use of a plain neutral solution, kept as near as possible to its full strength, varying from forty-five to sixty grains of nitrate of silver per ounce of water, and kept as near neutral as possible by means of carbonate of soda, and floating from three to five minutes.

To prepare a sensitive paper that keeps white for a week or so, nothing has been published that works so well as Mr. Blanchard's formula, given in April, 1879, and is as follows:—Prepare the silver solution, 60 grains to the ounce, and be careful not to allow it to sink lower than 50 grains to the ounce; for each ounce of nitrate of silver used, add 10 drops of a saturated solution of citric acid; now add nitric acid drop by drop, until the slight precipitate of citrate of silver formed is just re-dissolved. Float from three to five minutes, and upon taking from the bath, place between sheets of clean blotting-paper, which may be used over and over again until their power of absorption is almost destroyed, it being needless to observe that when this stage is reached the blotting-paper is especially available for the silver waste basket. Paper so prepared has been kept white and good for nine months, and the results, both in the way

of the fine, rich, vigorous prints, and ease of toning, leave nothing te be desired.

Toning.—The acetate of soda toning bath still holds its own against the many formulas for toning that have from time to time been published ; and deservedly so, as by its use the utmost range of tone can be secured at will, and if the silver be carefully washed out of the prints previous to toning, the acetate bath will keep in order for a considerable length of time, improving in quality with age, if properly strengthened, and not overworked.

For views, a handy and good toning bath is made by neutralising the chloride of gold with chalk, and using it in the proportion of one grain of gold to ten ounces of water ; the formula for the acetate of soda bath being—

Chloride of gold	1 grain
Acetate of soda	30 grains
Water	10 ounces

Fixing.—Four ounces of hyposulphite of soda to one pint of water, freshly made, the prints being immersed therein from ten to fifteen minutes, and kept continually on the move. Too many prints should not be fixed at a time in a small quantity of solution, nor should the hyposulphite be used a second time, when a great step in the direction of permanence is made.

Washing the print after fixing is a very important factor in securing lasting prints, and always receives a deal of attention from the careful photographer.

Constant changes of clean water for two or three hours will more effectually cleanse the prints than twelve hours' soaking, to the great advantage of the surface and general appearance of the print.

PLATINOTYPE PRINTING.

Saxe paper only is employed for this process. A coating of ferric oxalate and platinous chloride is applied to the surface of the paper by means of a brush or pad, the work being done by girls, who are more light-handed than men. The platinum salt is that most easily replaced, and the paper is now sensitive to light and fit for issue. But platinotype has one arch-enemy, and that is damp. If you will only keep the paper dry, and all things that come in contact with it, your printing will be a success ; but not otherwise. There is little difficulty about doing this, if you will follow the instructions of the Company ; a tube, or cylinder of tin, is a handy utensil for storing paper or prints, the cylinder having at one end a receptacle for chloride of calcium, while as to keeping the paper dry in the printing frames, this is done by the simple precaution of putting a soft rubber pad or sheet over negative and paper.

The sensitiveness of platinotype paper is calculated to be about three times that of chloride of silver paper, but you cannot watch the process of printing quite so well, the image is very faint, and it is not until the printer has had a little experience that he can judge accurately. The difficulty is one, however, easily surmounted, and moreover, when it comes to the development of the print, you have the means at hand to correct over and under-exposure.

For development, a solution of oxalate of potash is heated in a dish to 170° or 180° Fahr. If the prints are under-exposed (the first print of the batch is a good tell-tale) then the temperature is raised ; if over-printed, the developer is used less warm. Mr. Hollyer—one of the masters of the platinotype-printing—sometimes employs the bath only tepid, taking half a minute to

develop a print. But, as a rule, the image is developed instantly. No sooner have you placed the phantom brown image, face downwards, upon the warm solution, than a bright vigorous picture starts into view—a dark grey tint, forcible and strong, and yet possessed of that softness and delicacy which make platinotype so beloved by artists.

There is no toning, fixing, or even washing, in the ordinary sense of the term. A water bath acidulated with a little hydrochloric acid receives the print, which, after a minute or two, is lifted into a second, and maybe a third similar bath. The object is to discharge all the iron salt remaining in the paper, and as soon as the baths have no longer a yellow tint, the washing may be discontinued.

COLOURED PHOTOGRAPHIC PRINTS.

The patent of the Colour Photographic Company has lapsed, and is as follows:—

This process consists in obtaining colour photographs by means of two impressions from the negative—the first being a weak impression in order to give the outline for guiding the application of the colouring, and the second, after the colours have been applied, being an impression of sufficient strength to give the clear drawing, lights and shadows, and details of the picture.

In carrying out this process, I first take the negative in the ordinary manner. I then print on salted paper, already sensitized, a very light or faint proof of each negative, fixed and washed in the usual way. When dry, I immerse the print for two or three seconds only in pure alcohol, then dry it again, and afterwards pass it through the rolling-press. The print is then coloured with an ordinary hair-pencil in vegetable colours, the various tints being laid on smoothly, flatly, and lightly, without any regard to shading or softening off; but care being taken to have the tints brighter than they are intended to be finally. The colours are applied with the following mixture instead of with water:—

Albumen of egg	100 grammes
Distilled water	25 „
Pure glycerine	25 „
Sal-ammoniac	5 „
Liquid ammonia	4 drops

It will be found that the print will colour more easily if it be slightly moistened, and placed on a piece of glass. After the print has been coloured, it is again passed through the rolling-press. When perfectly dry, the coloured proof is immersed for a second time in pure alcohol, and is then albumenized in a bath composed as follows:—Whites of egg are beaten up, with 2 grammes of very pure sal-ammoniac added for every three whites of egg, 20 per cent. of distilled water, and about 4 drops of acetic acid for every 100 grammes of albumen. All is beaten up until the liquid attains a snowy appearance, when it is left at least eight days to stand. It is then decanted and ready for the coloured print, which should be carefully passed over the bath, and allowed to remain floating about sixty seconds. The print is then dried by heat, and finally passed through a sensitizing bath in order to be ready for the second impression. This bath is composed as follows:—

Distilled water	1,000 grammes
Nitrate of silver	100 „

The proof is again dried (but this time not by heat), and a second impression,

stronger than the first, is then taken by laying the negative very accurately over the first impression, so that all outlines, &c., rigidly correspond. This has the effect of establishing the picture, throwing out high-lights, &c. The proof is then toned and fixed in the usual way, and can be afterwards enamelled.

ALL ABOUT FERROTYPES.

The simplicity and ease with which ferrotypes are made, and their small cost, have rendered them very popular among a certain section of the public. In delicacy and gradation of tone they are in nowise inferior to positive pictures on glass, and, when carefully protected, may be regarded as thoroughly permanent. As their comparative cheapness requires that a large number should be turned out in the day, the operations and system of a ferrotype business should be as methodical and regular as possible. The dark-room, in which the processes of coating, sensitizing, and developing is similar to those in general use by photographers. Mr. Heighway, who contributed some excellent articles on the subject of ferrotypes to the Photographic News during the past year, recommends that the developing sink should be perforated with holes, and be supported over a large tank standing on the floor. The tank is coated with asphalte, and has a pipe fixed into it about nine inches from the floor; and carried down inside to within three inches from the bottom, and supplied with a tap on the outer side.

The wash waters and waste developer run into the tank, and the silver is precipitated every evening, by means of a saturated solution of ferrous sulphate, the clear water being run off to within three inches of the bottom every morning. The ferrotype plates and the collodion and varnish bottles should stand on a shelf facing the operator, the sensitizing and fixing baths occupying opposite sides of the developing sink. The light required in the dark-room is similar to that necessary for wet plates. The ferrotype plates must be cut to fit easily into the carriers, and care taken not to handle them with dirty fingers, as grease-marks are difficult to detect, and are the cause of numerous failures. The plates are cleaned by rubbing them with a tuft of cotton-wool moistened with alcohol, and polished with a piece of old, soft flannel. Any of the commercial samples of negative collodion are suitable for ferrotypes. Mr. Heighway remarks, however, that a collodion containing the potassium salts should not be used, as the films are rendered thereby too transparent; and he recommends the following formula:—

Ammonium iodide	35 grains
Cadmium iodide	25 ,,
Cadmium bromide	20 ,,
Pyroxyline	60 to 80 ,,
Alcohol	5 ounces
Ether	5 ,,

The silver bath may be prepared with either distilled or tap water, and should be about 40 grains to the ounce in strength. A small quantity of potassium iodide is added, and dilute nitric acid drop by drop, until the solution is faintly acid. When tap water is used, the solution is rendered faintly alkaline, and exposed to daylight in a clear bottle for a few hours. The dark precipitate is filtered out, and the solution, after acidifying, is ready for use. The bath should be always kept carefully covered up, and filtered each night after the

day's work, the necessary additions to its strength being made from time to time from a stock 60-grain solution.

When small plates are employed, they may be held in the fingers while being coated. The plate is waved to and fro till the collodion is set, and it is then lowered steadily into the bath, care being taken that the action is not arrested, otherwise wave marks will make their appearance on the plate. The time of sensitizing varies according to circumstances; but two or three minutes in summer time, and a little more in winter, will usually be found sufficient. After careful draining, the plate is placed in the carrier, and a piece of glass fitted into the back to support it during exposure.

It is advisable in all cases where possible to make use of a camera with repeating back, as by this means a large saving of time is effected, and several pictures can be taken on one plate. The cameras and lenses should be always kept carefully covered over with a cloth when out of use, and the inside of the apparatus wiped out at frequent intervals with a damp cloth. The development is carried out with ferrous sulphate, the proportions recommended being—

Ferrous sulphate	1 ounce
Water	16 „
Acetic acid	1 „

The plate is supported on a piece of glass during development. As in all other branches of photography, a perfect picture will result only from a correct exposure; an over-exposed positive being flat and wanting in contrast, while under-exposure yields results wanting in half-tones. A correctly-exposed picture will commence to make its appearance as soon as the developer is poured on the plate, and, when sufficient intensity is obtained, the plate should be flooded under the tap, and fixed either in a solution of potassium cyanide or hyposulphite of soda. It is then washed thoroughly, and dried over a spirit-lamp or before the fire.

The plate is varnished with any of the samples specially prepared for the purpose, a kind recommended by Mr. Heighway consisting of fine bleached shellac dissolved in alcohol. When varnished, the pictures are trimmed and mounted either in envelopes, lockets, or on cards, and, if necessary, can be coloured with dry powdered colours.

MODERN CYANOTYPE PRINTING.

Dr. J. M. Eder writes:—The details of a most excellent gum-iron process have now been given by Captain Pizzighelli; this method works thoroughly well, and yields most satisfactory prints. Thirty volumes of a solution of gum-arabic (water five parts, gum one part) are mixed with eight volumes of an aqueous solution of citrate of iron and ammonia (water two parts, double salt one part), and to the mixture is added five volumes of an aqueous solution of perchloride of iron (water two parts, iron one part).

The mixture appears limpid at first, but soon grows thicker, and it should be used quickly after mixing; it is applied to well-sized paper by means of a brush, the paper being dried in the dark.

Any design, drawing, or tracing may be employed as negative, and, after printing a few minutes, the development is proceeded with. A solution of ferro-cyanide of potassium (water five parts, ferro-cyanide one part) is applied with a brush, and the picture appears almost instantly as a dark-blue positive. As soon as every detail has appeared, the print is quickly rinsed, and then put

into a dish containing dilute hydrochloric acid (water ten parts, acid one part), when the image becomes clearer and brighter, the ground gets white, and the gum-iron film is removed. After further washing the print is dried.

The printing and finishing of impressions proceed very rapidly; in fair weather, it takes from one to two hours to carry out the whole process, preparing the paper into the bargain.

The whole secret of success lies in the use of the gum-arabic, which forms with the iron salts an almost insoluble combination, covering the paper like a varnish. For this reason, the pores of the paper are not filled with colouring matter where no colour is wanted. The acid bath removes the varnish-like film of gum, and leaves the clear positive picture in blue behind.

The following is a modification of the Pellet process. Copies of drawings or designs in black and white may be produced upon paper and linen by giving the surface of the latter two coatings of—

Gum-arabic	7 to 10 grammes
Citric acid	2 to 3 ,,
Water	85 cub. centimetres.
Iron chloride	4 to 6 ,,

The prepared material is printed under the drawing, and then immersed in a bath of yellow prussiate of potash, or of nitrate of silver, the picture thus developed being afterwards put in water slightly acidified with sulphuric or hydrochloric acid.

CITRIC ACID IN THE DEVELOPER.

Mr. Alexander Cowan writes :—After considerable experience with all the forms of pyrogallic mentioned, I venture to advocate the use of citric acid as follows :—

Water (distilled or common)	109 ounces
Citric acid	60 grains

After dissolving the citric acid in the water, add the contents of a one-ounce bottle of pyrogallic acid; this will give a solution containing about four grains to the ounce, ready at any moment to be mixed with equal proportions of any of the various modifications of ammonia and bromide that may be found to suit the development of the plates used. Of course, as some samples of plates require either a stronger or weaker solution of pyrogallic, the bulk of water may be diminished or increased, still keeping the proportion of citric acid the same, namely, about *one-eighth* the weight of the pyrogallic.

How long this solution will keep without losing its active properties I do not know; but having during the last three or four months occasionally set aside a portion from time to time, and carefully tested after keeping for three or four weeks, I have found it to develop in just the same manner as a newly-mixed solution.

In advocating the use of citric acid in conjunction with pyrogallic, I would wish to remark that I do not for a moment claim to be the first to discover its merits.

At one of the meetings of the Photographic Societies last year, Mr. Warnerke mentioned that he considered it a valuable addition in ferrous oxalate development, and casually remarked that he thought it might with

advantage be used with pyrogallic; but during that gentleman's absence abroad, I could not correctly ascertain in what proportions he proposed to use it, so set about to determine by experiment the smallest quantity that would give the desired result, and I can, with confidence, recommend the formula given above.

The reasons that led me to desire a good keeping solution of pyrogallic in water in preference to those containing spirit or glycerine were these: in the solutions where glycerine is used there is always a tendency to the formation of air-bells, which, unless carefully removed, cause small transparent spots, while in those containing spirit the plates require considerably more washing to remove the greasiness before placing in the fixing bath; neither of these inconveniences will be experienced in using a developer made with water only.

TO PRODUCE TRACINGS IN BLACK AND COLOUR BY PHOTOGRAPHY.

Two new processes for taking photo-tracings in black and colour have recently been published—*Nigrography* and *Anthrakotype*—both of which represent a real advance in photographic art. By these two processes we are enabled for the first time to accomplish the rapid production of positive copies in black of plans and other line drawings. Each of these new methods has its own sphere of action; both, therefore, should deserve equally descriptive notices.

For large plans, drawn with lines of even breadth, and showing no gradated lines, or such as shade into grey, the process styled "nigrography," invented by Itterheim, of Vienna, and patented both in Germany and Austria, will be found best adapted. The base of this process is a solution of gum, with which large sheets of paper can be more readily coated than with one of gelatine; it is, therefore, very suitable for the preparation of tracings of the largest size. The paper used must be the best drawing paper, thoroughly sized, and on this the solution, consisting of 25 parts of gum-arabic dissolved in 100 parts of water, to which are added 7 parts of potassium bichromate, and 1 part of alcohol, is spread with a broad flat brush. It is then dried, and if placed in a cool dark place, will keep good for a long time. When used, it is placed under the plan to be reproduced, and exposed to diffused light for from five to ten minutes—that is say, to about 14° of Vogel's photometer; it is then removed, and placed for twenty minutes in cold water, in order to wash out all the chromated gum which has not been affected by light. By pressing between two sheets of blotting-paper the water is then got rid of, and if the exposure has been correctly judged, the drawing will appear as dull lines on a shiny ground. After the paper has been completely dried, it is ready for the black colour. This consists of 5 parts of shellac, 100 parts of alcohol, and 15 parts of finely-powdered vine-black. A sponge is used to distribute the colour over the paper, and the latter is then laid in a two to three per cent. bath of sulphuric acid, where it must remain until the black colour can be easily removed by means of a stiff brush. All the lines of the drawing will then appear in black on a white ground. These nigrographic tracings are very fine, but they only appear in complete perfection when the lines of the original drawing are perfectly opaque. Half-tone lines, or the marks of a red pencil on the original, are not reproduced in the nigrographic copy.

"Anthrakotype" is a kind of dusting-on process. It was invented by Dr. Sobacchi, in the year 1879, and has been lately more fully described by Captain Pizzighelli. This process—called also *Photanthrakography*—is founded on the property of chromated gelatine which has not been acted on by light to swell up in lukewarm water, and to become tacky, so that in this condition it can retain powdered colour which has been dusted on it. Wherever, however, the chromated gelatine has been acted on by light, the surface becomes horny, undergoes no change in warm water, and loses all sign of tackiness. In this process, absolute opacity in the lines of the original drawing is by no means necessary, for it reproduces grey half-tone lines just as well as it does black ones. Pencil drawings can also be copied, and in this lies one great advantage of the process over other photo-tracing methods, for, to a certain extent, even half-tones can be produced.

For the paper for anthrakotype, an ordinary strong-sized paper must be selected. This must be coated with a gelatine solution (gelatine 1, water 30 parts) either by floating the paper on the solution, or by flowing the solution over the paper. In the latter case, the paper is softened by soaking in water, is then pressed on to a glass plate placed in a horizontal position, the edges are turned up, and the gelatine solution is poured into the trough thus formed. To sensitize the paper, it is dipped for a couple of minutes in a solution of potassium bichromate (1 in 25), then taken out and dried in the dark.

The paper is now placed beneath the drawing in a copying-frame, and exposed for several minutes to the light; it is afterwards laid in cold water in order to remove all excess of chromate. A copy of the original drawing now exists in relief on the swollen gelatine, and, in order to make this relief sticky, the paper is next dipped for a short time in water at a temperature of about 28° or 30° C. It is then laid on a smooth glass plate, superficially dried by means of blotting paper, and lamp-black or soot evenly dusted on over the whole surface by means of a fine sieve. Although lamp-black is so inexpensive, and so easily obtained, as material it answers the present purpose better than any other black colouring substance. If now the colour be evenly distributed with a broad brush, the whole surface of the paper will appear to be thoroughly black. In order to fix the colour on the tacky parts of the gelatine, the paper must next be dried by artificial heat—say by placing it near a stove—and this has the advantage of still further increasing the stickiness of the gelatine in the parts which have not been acted upon by light, so that the colouring matter adheres even more firmly to the gelatine. When the paper is thoroughly dry, place it in water, and let it be played on by a strong jet; this removes all the colour from the parts which have been exposed to the light, and so develops the picture. By a little gentle friction with a wet sponge, the development will be materially promoted.

A highly interesting peculiarity of this anthrakotype process is the fact that a copy, though it may have been incorrectly exposed, can still be saved. For instance, if the image does not seem vigorous enough, it can be intensified in the simplest way.

PHOTOGRAPHY ON CANVAS.

We recently paid a visit to Messrs. Winter's famous establishment in Vienna for producing enlargements on canvas.

"We cannot use English canvas, or 'shirting,' as you call it," said Messrs Winter; "it seems to contain so much fatty matter." The German

material, on the other hand, would appear to be fit for photography as soon as it has been thoroughly worked in hot water and rinsed. Here, in this red-bricked apartment, we see several pieces of canvas drying. It is a large room, very clean, here and there a washing trough, and in one corner two or three large horizontal baths. The appearance is that of a wash-house, except that all the assistants are men, and not washerwomen; there is plenty of water everywhere, and the floor is well drained to allow of its running off. We are to be favoured with a sight of the whole process, and this is the first operation.

Into one of the horizontal baths, measuring about 5 by 4 feet, is put the salting solution. It is a bath that can be rocked, or inclined in any direction, for its centre rests upon a ball-and-socket joint. It is of *papier mache*, the inside covered with white enamel. Formerly, only bromine salts were employed, but now the following formula is adopted:

Bromide of potassium	3 parts
Iodide of potassium	1 part
Bromide of cadmium	1 ,,
Water	240 parts

Four assistants are required in the operation, and the same number when it comes to sensitizing and developing, all of which processes are commenced in the same way. The bath is tilted so that the liquid collects at one end, and near this end two assistants hold across the bath a stout glass rod: then the canvas is dipped into the liquid, and drawn out by two other assistants over the glass rod. In this way, the canvas is thoroughly saturated, and, at the same time, drained of superfluous liquid.

The canvas is hung up to dry; but as some time must elapse before this particular piece will be ready for sensitizing, we proceed with another canvas which is fit and proper for that process. The room, we should have mentioned, is provided with windows of yellow glass; but, as there is plenty of light nevertheless, the fact hardly strikes one on entering. The sensitizing, with a solution of nitrate of silver, is conducted with a glass rod in the same way as before, the solution being thus compounded:

Nitrate of silver	4 parts
Citric acid	1 part
Water	140 parts

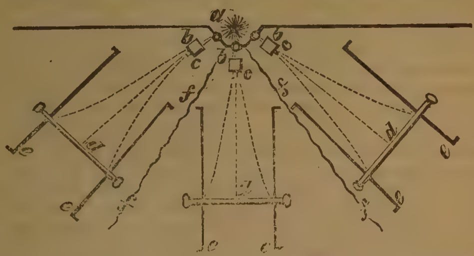
Again the canvas is dried, and then comes its exposure.

This is done in a room adjoining. We lift a curtain, and enter a space that reminds one of the underground regions of a theatre. There are curtained partitions and wooden structures on every hand, dark murky corners combined with brilliant illumination. Messrs. Winter use the electric light for enlarging, a lamp of Siemens' driven by a six-horse power engine. The lamp is outside the enlarging room, and three large lenses, or condensers, on three sides of the light, permit the making of three enlargements at one end at the same time. Our rough sketch of work gives an idea of the disposition of affairs (see fig., page 151).

The condenser collects the rays, and these shine into a camera arrangement in which the small negative is contained. The enlarged image is then projected, magic lantern fashion, upon the screen, to which is fastened the sensitized canvas. The screen in question is upon a tramway—there are three tramways and three screens in all, as shown in our sketch—and for this

reason, it is easy to advance and retire the canvas, for the purpose of properly focussing it.

Even with the electric light now employed, it is necessary to expose a considerable time, to secure a vigorous impression. From ten minutes to half an hour is the usual period, determined by the assistant, whose experienced eye is the only guide. We should estimate the distance of the canvas from



a, electric light; *b*, condensers; *c*, cameras; *d*, canvas on screen; *e*, tramways; *f*, curtained partitions.

the enlarging apparatus to be about fourteen or fifteen feet in the instance we saw, and when the camera was taken down, a distinct outline of the image was visible on its surface.

By the way, we ought to mention that the canvas is in a decidedly limp state during these operations. It has just sufficient stiffness to keep smooth on the screen, and that is all; the treatment it has received appears to have imparted no increase of substance to it. Again it is brought into the red-brick washing apartment, and again treated in one of the white enamelled baths as before. This time it is the developer that is contained in the bath, and the small limp table-cloth—for that is what it looks like—after being drawn over the glass rod, is put back into the bath, and the developing solution rocked to and fro over it. The whiteness of the bath lining assists one in forming a judgment of the image, as it now gradually develops and grows stronger. Here is the formula of the developer:—

Pyrogallic acid	10 parts
Citric acid	45 ,,
Water	410 ,,

The developer—which, it will be noted, is very acid—is warmed before it is used, say to a temperature of 30° to 40° C.; nevertheless, the development does not proceed very quickly. As we watched, exactly eight minutes elapsed before Mr. Winter cried out sharply, "That will do." Immediately one of the assistants seizes the wet canvas, crumples it up without more ado, as if it were dirty linen, and takes it off to a wooden washing trough, where it is kneaded and washed in true washerwoman fashion. Water in plenty is sluiced over it, and after more vigorous manipulations still, it is passed from trough to trough until deemed sufficiently free from soluble salts to tone. The toning—done in the ordinary way with gold—removes any unpleasant redness the picture possesses, and then follows the fixing operation in hyposulphite. As canvas is more permeable than paper, these two last processes are quickly got through.

The final washing of the canvas is very thorough. Again it is treated with all the vigour with which a good laundry-maid attacks dirty linen, the canvas, in the end, being consigned to a regular washing-machine, in which it is systematically worked for some time.

When the canvas picture at last is finished, it presents a very rough appearance, by reason of the tiny fibres that stand erect all over the surface. To lay these, and also to improve the surface generally, the canvas is waxed, the fabric is stretched, and a semi-fluid mass rubbed into it, heat being used in the process, which not only gives brilliancy, but seems also to impart transparency to the shadows of the picture. The result is a pleasant finish, without vulgar glare or glaze, the high-lights remaining beautifully pure and white.

Of course, the price of these canvas enlargements varies with the amount of artistic work subsequently put upon them; but the usual charge made by Messrs. Winter for a well-finished life-sized portrait, three-quarter length, is sixty florins, or about £5 sterling as the exchange now stands. Messrs. Winter are reproducing a large number of classic paintings and cartoons by photography on canvas in this way.

COLLODIO-CHLORIDE EMULSION FOR DEVELOPMENT.

Captain W. de W. Abney, R.E., F.R.S., writes:—To make the collodio-chloride we proceeds as follows:—

Weigh out the following—

Pyroxyline (any easy soluble sort)...	10 grains
" " "	5 "
Calcium chloride	20 "
Silver nitrate...	50 "

Dissolve the calcium chloride in half-ounce of alcohol ·805, by warming over a spirit lamp. Place the 5 grains of pyroxyline in a 2-ounce bottle, and pour on it the alcohol containing the calcium. After a couple of minutes add half-ounce of ether, when the cotton will dissolve.

Dissolve the 50 grains of silver nitrate in a test-tube in the smallest quantity of water, and add to it 1 ounce of boiling alcohol ·805, and mix. Previous to this the 10 grains of pyroxyline should have been placed in a four-ounce bottle, and the alcohol containing the silver should be poured on it. Next add 1 ounce of ether, little by little, with continuous shaking. The silver nitrate may very probably partially crystallize out, but that is of very little consequence. Take the two bottles into the dark-room (a room glazed for wet-plate work will answer perfectly), and *pour gradually the calcium chloride collodion into the silver nitrate collodion**—on no account *vice versa*. The resulting emulsion, of course, is silver chloride in an extremely fine state of division. A plate coated with it should show daylight as canary-coloured, and a thickish film should make a gas-flame appear ruby-coloured when examined through it. The emulsion may be washed in the usual way, if required; but, when washed, and used simply dried after washing, it is, like other collodion emulsion prepared with an excess of haloid, rather insensitive. Before doing anything with the emulsion, however, a plate should be coated, washed under the tap, and placed in the dark slide. The slide should be taken into white light, and half the

* I wish the printer could doubly italicise this sentence; it is deserving of capital letters.

front pulled up for a second, and then closed. Ferrous-citro-oxalate developer should then be applied, and the result noted. With two lots of emulsion I made, the only thing I noted was a blackening all at once of the film, and no doubt those who try this method will find the same result. The first lot I made was perfectly clean, and without any reduction of the chloride (except on the exposed half of the plate) on the application of the developer. The question resolves itself into this—how to cure an emulsion which fogs. You may add nitric acid, but that rather rots the film if kept too long in contact with the emulsion. A simpler plan is to add a chloride which can form a double chloride. Having at hand cupric chloride (chloride of copper) dissolved in alcohol, I dropped 3 or 4 drops of a 20-grain solution into the emulsions, shook up, and immediately the fog disappeared, as a trial plate showed. Two or three drops of chloride of gold, or cobaltic chloride solution, would answer equally as well as the cupric chloride, for the reason just given.

So far, as regards the making of the emulsion. The next point is the preparation of the plate. As was said before, it can be washed, but I really see no advantage in so doing. I have coated plates merely polished and edged, washed them, and then simply flooded them once over with—

Beer	5 ounces
Sugar (white)	1 moderate sized lump
Pyrogallic acid	5 grains

These when dry were admirably sensitive, and would put to shame many a collodio-bromide emulsion which I have tried. To develop them, rinse them under the tap, and then simply immerse them in a dish containing the ferrous-citro-oxalate. In a short time the image will begin to appear, and gradually gain strength. The colour of the image is a beautiful ivory black, and admirably suited for collodion transfers. If a warmer tint is required, tone in a dish with—

Uranium nitrate	10 grains
Ferricyanide of potassium	10 ,,
Water	10 ounces
Gold chloride	½ grain

The colour will rapidly warm up the image, and will eventually become a pretty chocolate colour if sufficient time be given it.

It will be noted that an emulsion prepared in this way may be developed by the ferrous-citro-oxalate *without any restrainer*. Dr. Eder recommended the development of gelatine plates with hydrokinone with a solution of carbonate of ammonia and some soluble chloride. These plates develop with the same, but the chloride may be omitted. For immediate use in the camera, the plates need only be washed well under the tap, and exposed wet.

Everyday Experiences of Experienced Men.

ELECTRIC LIGHT FOR PHOTOGRAPHIC PURPOSES.

Mr. A. J. Jarman writes:—For some time past, it has been the desire of many photographers to have at hand a ready means of producing a powerful and highly actinic artificial light, suitable for the production of negatives, and easily controllable.

In my apparatus, the generator of the electric current consists of a series of elements of zinc and carbon—forty-eight in number—these elements being made up of ninety-six zinc plates, and forty-eight carbon plates; thus the generator consists of forty-eight voltaic elements arranged in rows of twelve; they are all carefully screwed upon suitable bars of wood, and these bars are joined by other cross-bars, which bind the whole in a compact form, the battery being suitably connected so as to produce a current of very high electro-motive force, and so arranged over their exciting trough that the plates can be raised or lowered at will, as seen in fig. 1, which will explain itself almost at first sight.

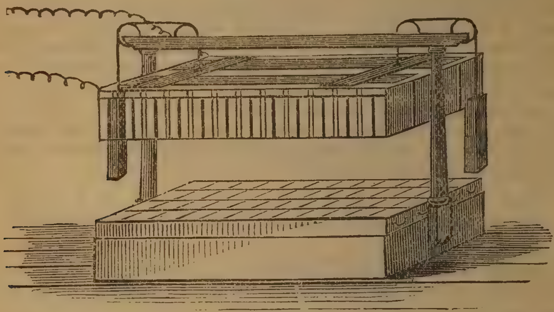


Fig. 1.

The troughs are made of mahogany put together with brass screws, and well saturated with an insulating compound, which also makes them acid-proof; the cells are charged with a saturated solution of bichromate of potash, to which has been added twenty fluid ounces of sulphuric acid to each gallon.

To produce the electric current, all that is needed is to lower these suspended elements down into the trough, having previously connected the wires as shown in fig. 1 to the electric lamp, fig. 2. At once a light starts up, between the carbon pencils, of a thousand-candle power or more. With a light of this power, a large head on cabinet or carte size plate may be produced in three or four seconds.

The generator occupies a floor space of three feet six inches by two feet, and stands two feet six inches high. The cells will cost 5s. to charge, and will produce upwards of sixty negatives before being exhausted. All that is necessary, in re-charging, is to lift the elements up out of the way, take out the troughs by their handles and empty them, charging them again by means of a toilet jug. When replaced, the whole apparatus is fit for use again; the whole of the above operation occupies but a quarter of an hour, and as there are no earthenware cells employed, there is no fear of breakage.

The small amount of labour and cost of working the above apparatus will compare favourably with the production of the electric light from a dynamo-electric machine for the photographer, and when we consider that the cost of the whole of the above apparatus, consisting of a generator, automatic lamp, reflector, and all the necessary appendages, is less than one-tenth of the dynamo-machine, motor, shafting, &c., to produce the same result, it would seem to have a greater claim for its adoption with those who wish to employ the electric light,

whether for work at night, use in the sitting-room, or to assist daylight on the dark and foggy days of winter.

Fig. 2 shows the arrangement of the electric lamp. A is the automatic regulator, B the reflector, C top extension of the reflector D small tissue paper screen

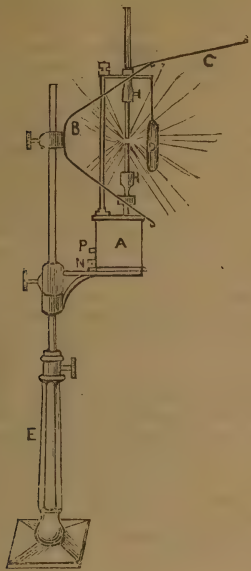


Fig. 2.

to prevent the intense arc-rays from coming in contact with the sitter, E stand with sliding rod. This appendage can be wheeled about with ease, as it is arranged to run upon four castors.

When the generator is in use, it may be placed within easy reach of the operator, so that the exposure may be made by lowering the elements in their troughs, just for the requisite time, and withdrawing immediately the exposure is made; there is no need to fear any inconvenience from deleterious fumes, as none are given off, so it may be used in any studio or sitting-room without any inconvenience from this source, and as far as many trials have gone it seems to meet every requirement demanded by the photographer for the production of portraits by means of the electric light.

THE STORY OF THE STARS.

"Here are my star photographs," said Dr. Huggins. A small drawer is before us, filled with neat little leather boxes, that might be jewel cases, only that their contents are more precious than jewels. For truly, no labourer in the diamond fields ever worked harder than Dr. Huggins has done to secure

these tiny gems. Here is a tray of them! Each represents a glinting star from our lustrous firmament. This one is Sirius, or the Dog Star; this is Vega; this, one of the glittering constellation known as the Great Bear; another is Arcturus; yet another Capella; and this last, the yellow star Aldebaran. Were they but rubies and sapphires, a lucky search would have secured them in a month; as it is, they represent the labours of a life-time.

They are minute photographic negatives, as we see clearly enough now we are permitted to take one in our hands and examine it under a magnifier. The image is half-an-inch long, and about an eighth-of-an-inch broad, a little white band with zebra stripes—or more, perhaps, like a bit of bamboo straw with well-marked joints. The stripes are not all of the same thickness, nor are they always at equal distances, and it is to this circumstance particularly that our host calls attention, for on the presence or absence of these lines the whole teaching of Dr. Huggins' wonderful discoveries in connection with the star world depends.

But we must go back a little to explain Dr. Huggins' research clearly. For instance, they teach us, as we shall presently see, how it is possible to classify the stars; how some are very much like our sun—which is simply a star, and nothing else, and only appears larger because it is not so many millions of miles off, as the rest of them—and how some are glowing masses of matter only just beginning to burn, while others have been alight so long that they are nearly burnt out. These old, worn-out stars—or suns, if you like to call them so—will in all probability soon become but a mass of cinder or pumice-stone, such as our moon now is, which, as everybody knows, gives forth no light itself, and only shines when it reflects back the sunlight thrown upon it.

The pictures before us are not simply photographs of the stars, but photographs of the spectra of the stars. And, here, please, one word before embarking on our explanation. Lest the reader take fright at the word spectrum, or spectra, we want to say at the outset that we are not going to use any scientific terms whatever, or allude to any abstruse matters. We are going to give as unscientific an account of Dr. Huggins' investigation as we possibly can; that is our only object, and we shall be but too pleased if we err on the side of puerility.

We say, Dr. Huggins photographs the spectrum of a star, and not the star itself, and this is easily explained. Everybody who has entered a room in which a chandelier with glass drops happens to be, or lustres on the mantelpiece, knows very well that the colours of the rainbow frequently hover about them. The reason of this, too, most people know. A ray of sunlight, or daylight, however white and shining it appears under ordinary circumstances, is made up of a bundle or faggot of coloured rays, and the coloured rays are seen whenever the faggot gets dispersed. Many things will cause the dispersion of light, and turn a white ray into a broad-coloured band, or ribbon of red, yellow, blue, and violet. Out of doors the rain often does this for us, and then we get the rainbow; but indoors, the dispersion of light is generally due to the triangular or prism-like drops of our chandeliers and lustres. Whenever you put a prism of glass in the path of a beam of sunlight, you get this dispersion or separation of the faggot; and this dispersion is called the spectrum. If it be a beam of sunlight that is dispersed into colours, we call the band of colours the spectrum of the sun or solar spectrum; if we look at the light from one of the stars, putting first of all a prism in the way between our eye and the star to disperse the ray, then the colours shown, we term the spectrum of a star.

"But what amount of light can possibly come from a star?" the reader will

exclaim. "Surely the twinkling spots we see in the heavens are not sufficient for dispersion, and for the formation of a coloured rainbow or spectrum." We answer, not only is the light of our stars sufficient to give a tiny rainbow—by making it go through a prism—but this tiny rainbow or star spectrum can be photographed, thanks to rapid gelatine plates, and it is just this wonderful feat which Dr. Huggins has accomplished.

Of course, in his tiny pictures, we see no colour; this has yet to come. But we see something that is more important even than colour. We have spoken of star spectra, and of the spectrum given by the sun, and we may mention that most bodies that emit rays are capable of furnishing a spectrum. A red-hot poker, for instance, will give you a spectrum, and so will a glowing coal. But if you want to see the colours to perfection, as they come from the prism, you must look at them in the dark; just as in camera work, you can see best to focus when extraneous light is cut off. Thus, if you darken the room in which your prism is, and only let in a beam of sunshine through a chink in the shutter, your colours, or spectrum, or rainbow, whatever you choose to call it, will be very vivid. You see the white ray coming sharp and straight from the shutter to the prism, and then dispersed into a spectrum. The more narrow your chink or slit, the clearer will be your spectrum; and when you have narrowed the slit to something like $\frac{1}{350}$ of an inch, you will find in the spectrum something more than a row of mere colours. You will see a lot of little upright lines, which you have not seen before; and it is these lines, particularly their place in the spectrum, their number, and their thickness, which is of importance. They are a language, which we cannot as yet read distinctly, but which, little by little, we are beginning to understand. Already these lines in the spectrum have told us much of which before we knew nothing; what they will reveal in the future, the future alone can tell.

Dr. Huggins, then, photographs the spectrum of a star; that is, he does not present his camera directly at the heavens; before the light of the star is allowed to shine upon his sensitive plate, it is compelled to pass through a prism to be dispersed, and it is this dispersed light—this band of colours—this spectrum—of which he gets an image. And he gets not only an image of the spectrum, or rainbow, but of the little upright lines in the spectrum, too. As we said before, his negative pictures are little white bands with "zebra stripes," these stripes, more or less vivid, being no other than the lines in the spectrum.

Now, what do these lines mean? They have reference to certain metals or substances. Thus, if we take a spoonful of common salt—or chloride of sodium, as chemists call it—and burn it in a flame, and then examine that flame, we shall find in the spectrum that it casts an upright line of a vivid yellow. This line appears in the red part of the rainbow, or spectrum, and whenever sodium is present in a flame, no matter how minute the quantity, this line always makes its appearance, and always in precisely the same position of the spectrum. We can only argue one thing from this; that there is sodium present whenever we see the line. Hence it is called the sodium line. Mr. William Crookes, the first editor of the PHOTOGRAPHIC NEWS, one day burning some sulphur, and looking at the spectrum of the flame, discovered, to his surprise, a line he had never seen before. It was a single green line, and hence he knew that there must be something present in the flame of which chemists at that moment knew nothing. He proceeded with his investigation, and, in a few days, was able to announce to the world that he had discovered, through the medium of the spectrum, an entirely new metal, to which he gave the name of Thallium.

Since, then, the lines tell us of the presence of certain bodies we have in the spectrum, we have here a very easy and simple way of finding out what is in a substance that is burning. We can tell if it contain copper, iron, sodium, &c. The lines proclaim the fact at once. It is, in a word, a most efficient and quick method of analysis, this method of spectrum analysis. A ray of sunshine, falling upon a prism, and dispersing, exhibits lines that leave little doubt that in the glowing mass we call the sun, there is sodium, iron, hydrogen in vast quantities, &c. Dr. Huggins, in like manner, has examined the light from various stars, and, from the lines he has obtained, he tells us how, in the bright star Sirius, there are sodium, magnesium, hydrogen, and iron, and in the red star Aldebaran these are to be found in conjunction with bismuth, antimony, and mercury.

Now we come to the important task which photography has fulfilled in connection with this wonderful investigation. We have hitherto spoken of lines visible to the eye. But, at one edge of the rainbow, or spectrum, in the violet and lavender regions, there are lines which are invisible to the eye, but which can, nevertheless, be photographed. Dr. Huggins, indeed, does not care to photograph more than half the spectrum; the red and yellow parts he can best examine with the eye, and therefore he confines himself to photographing the lines in the violet and lavender regions, and in the region beyond, which, curiously enough, we cannot see at all. And it is precisely these regions that appear to be most interesting so far as the stars are concerned. His little photographs show at once that there are, at any rate, three distinct classes of stars. There are those, for instance, which give twelve distinct lines, or zebra stripes. These lines are evidently due to hydrogen, and denote vast masses of this inflammable gas to be present in the stars. All white stars give these twelve lines, such as Sirius, Vega, the Great Bear, &c., and for this reason it is presumed that they are youthful stars. Next, there are stars that give lines, or spectra, so much like the lines given by our own sun, that they are doubtless of the same age, and have been burning about as long; Capella is one of these which, among other things, do not show the hydrogen lines so perfectly. Finally, we have old suns, like Arcturus, and the red star Aldebaran, which seem to be rapidly burning themselves out; the spectrum here is very different, the twelve hydrogen lines, as an instance, being reduced to six.

Dr. Huggins invites us into his observatory, and we climb the stairs in his company. We make our way through a well-appointed laboratory, then ascend into an apparatus room, full of magnificent electrical paraphernalia and optical appliances, and finally, pushing open a trap above our heads, reach the "star chamber." It is not very high up, after all, where Dr. Huggins holds communion with the stars. Yet we may here see farther into the heavens than from the loftiest spire upon earth.

In the centre is a vast telescope, some twelve feet long, and twenty inches in diameter; it is inclined upwards through an orifice in the roof, the roof itself being dome-shaped, and capable of revolution, so that the whole hemisphere of the heavens may in turn be examined.

It is here that the work to which we have alluded has been performed—work which may seem simple enough to the reader, but which has involved the exercise of patience and perseverance indescribable. Who shall tell of the countless watchings, the indomitable fortitude, the persistent activity by which the triumph has been gained? Fortunately, our worthy host has a worthy assistant in the person of Mrs. Huggins, to whom is due, in no small measure, the success of his labours. Our readers know full well how feeble is the light of a

star; and when they bear in mind that only as much of that light as can come through a slit $\frac{1}{350}$ of an inch is permitted to act on the photographic plate, this light being not in the form of a pin's point, but spread over half an inch surface, they will understand that a long exposure is necessary. Sometimes, indeed, two hours are required to impress the image, and during the whole of this weary interval it is the duty of the doctor's chief assistant to watch that star, and see that it remains in its proper place upon the slit of the instrument. The stars, as we all know, are constantly moving—or, rather, the earth is, which is the same thing—and the consequence is that the big telescope, in which the camera and spectrum apparatus are placed, has to be kept moving, too, by clockwork, to keep up with the star. But, delicately-regulated as the clockwork is, it cannot always be depended upon to move the telescope exactly at the same rate as the earth. For this reason it is, that Mrs. Huggins duly watches to see it do its duty, the lady having appliances at hand whereby she can amend the speed, and catch the star again by going a little faster, or slower, as the case may be.

Mrs. Huggins is also an accomplished photographer, and is conversant with all the advances recently made. Indeed, it is only, as one can well understand, with the aid of very sensitive gelatine plates that some of the stars—the red ones and the yellow ones particularly—can be made to tell their interesting story. "It is all very well to speak lightly of doubling the exposure," says Dr. Huggins, "when it is a question of but seconds only; but, in my case, it is a matter of hours." Dr. Huggins, in his work, soon gets to know of a plate's sensitiveness; making long exposures during the weary watches of the night is a crucial test for the sensitive film.

And now, if the reader will but listen another moment, we can, in a very few words, explain how Dr. Huggins does his photographic work. We have said that the little camera and spectrum apparatus are inside the telescope, and we have explained how it is necessary, in order to get a proper image upon the sensitive plate, that the light from the star should shine into the apparatus through a tiny slit not more than $\frac{1}{350}$ of an inch broad. The great thing to be accomplished, therefore, is to get the little luminary to settle exactly upon this slit, and *to keep it there* during the long time necessary for the exposure. It is done in this way. The telescope, which is nothing more than a hollow tube, is directed towards the heavens, and in such a way that the star shines down the tube. There are many stars, of course, but Dr. Huggins has only to do with one at a time. At the bottom of the tube or telescope is a mirror, and the consequence is that the star, looking down the tube, shines upon the mirror. The mirror, then, by careful handling, is made to reflect the particular star upon the slit of the camera apparatus, and very nicely indeed has the mirror to be adjusted to do this. But this difficult task it fulfils, nevertheless, under the skilful hand of Mrs. Huggins, and to that lady, as we have said, falls the onerous duty of continually watching to see that the tiny spot of light keeps hovering over the slit. Of course, the big telescope is moving all the while, and the camera inside as well, by means of the clockwork, to which we have referred, in order to keep up with the moving star; but let the mechanism be ever so well-regulated, it requires unremitting attention, so that, as we have said, the eye has continually to watch the position of the star upon the apparatus the whole weary time of the exposure.

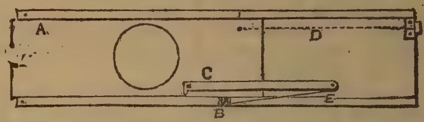
It is only on certain nights in the year that star photography is at all possible. You must be for ever on the alert, watching your opportunity. The night must not only be clear, but steady. After rain the stars are sometimes very

bright, and they do not twinkle, a sure sign of atmospherical disturbance. Here is the tiny camera fixed at the end of the spectrum apparatus, and here the little dark slide that receives the plate; it is half-an-inch broad and two inches long—surely, the smallest dark slide in the world! Autumn and spring Dr. Huggins prefers for his photographic work, and, if possible, he brings his labours to an end at midnight. In wintry weather he can commence work about six; but in the summer time he has sometimes to wait till ten before the stars are bright enough for his purpose.

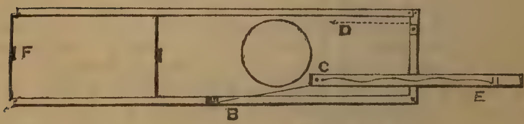
We hope our readers have been interested in the story of the stars, and we hope that next time they see something about spectrum photography, or star spectra, they will not turn away with the expression—"Oh, I know nothing about such things!"

MEASURING DURATION OF EXPOSURE.

MR. A. HADDON says:—The method I propose is to cause the moving shutter to push aside a vibrating prong, to the end of which is attached a bristle or other suitable style; the prong when released carries the style over a smooth surface, on which has been smeared some easily detached powder; then, by knowing the rate of vibration of the prong, and the number of complete waves



Shutter set ready for exposing.



Shutter after exposure, showing wave line made by the style.

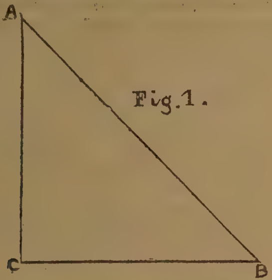
A, slide of shutter.
B, reverberating prong kept back by small pillar, E.
C, brass plate smeared with lamp black and spirit.
D, spring of shutter.
E, trigger to release shutter.

marked on the surface, we have at once the duration of the exposure. If we find that on a particular day we gave, say, $\frac{1}{20}$ of a second, and to-day the light, by trial, is only $\frac{1}{2}$ as actinic as it was on that day, we can easily adjust the spring which gives motion to the shutter, till we have doubled the number of complete waves depicted, and so doubled the exposure; if, on the contrary, the light is twice as actinic, we can use a stop, and still use the same length of exposure. I do not wish it to be understood that I advocate this form of shutter, or any other; all that I wish to draw attention to is the method by which the shutter is made to register the duration of the action of light.

STOPS.

Mr. Horace Wilmer writes:—The stops as issued at present by manufacturers of lenses do not, as a rule, represent simple proportionate exposures, but vary according to some secret and mysterious law which Stuart Mill would probably describe as empirical. The most simple series of stops which can be used are those the diameters of which proceed in such a ratio that the exposure for each stop is double that required for the preceding one. The diameters for such a series can be easily calculated by multiplying each diameter by $\sqrt{2}$ (that is, by the figure 1·41); but as this is a tedious operation, and requires that the results so found should be converted afterwards into what Mr. Gladstone calls measurable distances, I venture to offer a method which is mathematically correct, and unmathematically simple.

Euclid, who I am sure must have studied photography deeply, proved that the square described on the hypothenuse of a right-angled triangle is equal to the sum of those described on the other two sides, and on this simple but valuable fact is based the whole of my suggestiou.



In the triangle ABC, the square on AB is equal to the sum of the squares on AC and CB. Now, if AC be equal to CB, the square on AB will be double of the square on either AC or CB, and consequently if the diameter of a certain stop be equal to AC or CB, a stop whose diameter is equal to AB will have double the area, and will therefore require only half the exposure. I can see the Editor raise his eyes in pious horror to think that this is all, but at the risk of being ranked in the category of those who have "taken him in," I will proceed to describe the best way of constructing such a scale.

Take a piece of card, and lay off two lines at right angles to each other, and from their point of intersection, C, mark off equal divisions on the lines CA and CB. Number the divisions horizontally and vertically, making the zero of the scale at C, and join the corresponding points so obtained by diagonal lines. The latter proceeding is not absolutely necessary, but assists in determining the length of any diagonal which falls between any pair of consecutive points. To use the scale, any stop which may be accepted as the starting smallest stop is measured on the horizontal or vertical lines, and the corresponding diagonal line will be the diameter of the next sized stop. This length, when found, is measured along the horizontal line again, and a new diagonal found for the next stop in series. If the largest stop is chosen to start with, the proceeding is reversed, and the line of diagonals used to determine the point on the horizontal

line giving the next smaller line. Perhaps the simplest method is to use a pair of identical scales, as in fig. 3. Assume the smaller stop to measure 2 on the

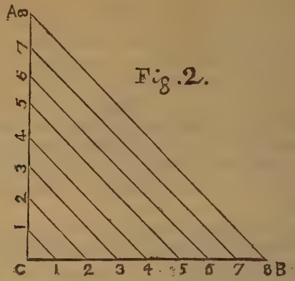


Fig. 2.

horizontal, the next stop will be 2 on the diagonal. Now lay the second scale on the line so found, note the dimension on the CB, and the diagonal corresponding will be the 3rd stop required. Use No. 1 scale on No. 2 for the next

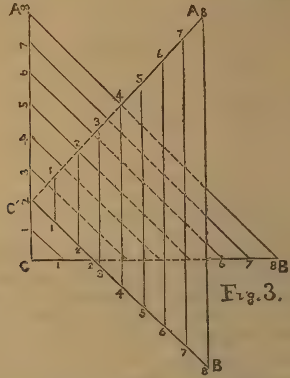


Fig. 3.

stop, and so on for the whole series. I beg to hand my friend Euclid the credit of this in return for many valuable suggestions.

COLLOTYPE OR LICHTDRUCK PRINTING AT THE PRESENT DAY.

In Herr Löwy's compact establishment at Vienna, there is a *personnel* of no less than forty, of which the greater number are employed upon Licthdruck. There are both the Schnell-press (quick-press) and hand-press here, for Herr Löwy does work of all sorts, from the finest to the roughest. It is rather a warm atmosphere into which we are first introduced, an apartment not very roomy, and not very light, and here we are initiated into the first stage of the process.

Here is a sheet of glass. It is very thick, apparently a quarter of an inch, and it is to be made into a printing block. The glass has been cleaned, and is now ready to receive the preliminary coating. The solution must be used *fresh*, and is prepared of—

Soluble glass	3 parts
White of egg	7 „
Water	9 to 10 „

The soluble glass must be free from caustic potash. The mixture is filtered, and made use of the same day, being applied to the glass as even as possible. The superfluous liquid is poured off, and the film dried either spontaneously, or by slightly warming. The film is generally dry in a few minutes, when it is rinsed with water, bearing an open, porous surface that is said to be slightly opalescent. We are bound to say, however, that this opalescence is so slight as to be scarcely visible to our inexperienced eyes.

Many of these plates (the surface now perfectly dry) are here ready for further treatment. They stand upon a slate slab, which is warm, for underneath is a water-bath. Herr Furkl, the skilful manager of this department, is one of the most experienced of Lichtdruck photographers, and he sees at a glance the quality of a prepared plate, without any practical testing. "Now, this is a good preliminary film," he says; it is a glass that is transparent, and yet slightly dull. The film is so thin, you can scarcely believe it is there.

We now come to the second stage of the process—the application of a film of bichromated gelatine to the plate. This is the formula generally used:—

Bichromate of potash	15 grammes
Gelatine	$2\frac{1}{2}$ ounces
Water	20 to 22 „

According to the weather, the amount of water is varied; but, in any case, the solution is a very fluid one. An ounce is about 35 grammes, as our readers know.

The bichromated gelatine is poured upon the plate (it makes a very thin film), and the glass then put into the drying-chamber. Much depends upon the drying. A water-bath with gas-burner is used for heating, and a slate slab, perfectly level, receives the glass plate. The drying-chamber is kept at an even temperature of 50° C. The object to be attained is a fine grain throughout the surface of the gelatine, and unless this grain is satisfactory, the finished printing-block never will be. If the gelatine film is too thick, then the grain will be coarse; or, again, if the temperature in drying be too high, there will be *no grain at all.* The drying is complete in two or three hours, and should not take longer.

The film is now ready for printing under a negative, and this is done in an ordinary printing-frame. The sensitive film being upon the surface of a thick glass plate, it is necessary that the cliché or negative employed should be upon patent plate, or not upon glass at all, so as to ensure perfect contact. Best of all is it to employ a stripped negative, in which case absolute contact is ensured in printing. It is only in these circumstances that the most perfect impression can be secured.

The exposure is very rapid. Any one accustomed to photo-lithographic work will understand this. At any rate, every photographer knows that bichromated gelatine is much more sensitive than the chloride of silver he generally has to do with. There is no other way of measuring the exposure than by

photometer, or personal experience; and the latter, we are assured, is by far the best method.

The impression is taken from the pressure-frame, and put into cold water. Here it remains for half-an-hour or an hour, according to discretion. The purpose is, of course, to permit the soluble bichromate to wash out. It is when the print comes out of this bath that judgment is passed upon it. An experienced eye tells at once what it is fit for. If it is yellow, the yellowness must be of the slightest; indeed, Herr Furkl will not admit that a good plate is yellow at all. A yellow tint means that it will take up too much ink when the roller is passed over it.

The washed and dried plate should appear like a design of ground and polished glass. The ground-glass appearance is given by the grain. If there are pure lights (almost transparent) and opalescent shadows, the plate is a good one.

We have now a printing-block ready for the press. If it is to be printed by machinery (that is to say, in a *Schnell-press*), the surface is etched; if it is to be more carefully handled in a hand-press, etching is rarely resorted to, and it is moistened only with glycerine and water.

Here is a plate about to be etched. It is placed upon a levelling-stand, and the etching fluid poured upon it. The formula is—

Glycerine	150 parts
Ammonia	50 „
Nitrate of potash (saltpetre)	5 „
Water	25 „

Another equally good formula, which is recommended by Allgeyer, who managed Herr Albert's Lichtdruck printing for some years, is—

Glycerine	500 parts
Water	500 „
Chloride of sodium (common salt)...	15 „

In lieu of common salt, 15 parts of hyposulphite of soda or other hygroscopic salt, such as chloride of calcium, may be employed.

The etching fluid is permitted to remain upon the image for half-an-hour. Herr Furkl invites us to touch the plate, and by gently moving the finger to and fro over the surface, we distinctly feel the swelling or relief of the image. The plate is *not washed* afterwards, but the etching fluid simply poured off, so that the printing block remains impregnated with glycerine and water; at the most a piece of bibulous paper is used to absorb any superfluous quantity of the etching fluid. After etching, the block goes straight to the printing-press.

The inking-up and printing are done very much as in lithography. If it requires a practised hand to produce a good lithographic print, it stands to reason that in dealing with a gelatine printing block, instead of a stone, skill and practice are more necessary still. Therefore, at this point the photographer should hand over the work to the lithographer, or rather the Lichtdruck-printer. It is only by coaxing judiciously with roller and sponge, that a good printing block can be obtained, and no amount of teaching theoretically can beget a good printer. To appreciate how skilful a printer must be, it is only necessary, indeed, to see the imperfect proofs that first result, and to watch how these are gradually improved by dint of rolling, rubbing, etching, cleaning, &c.

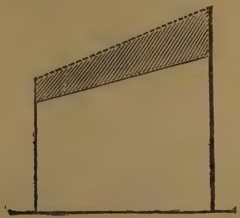
In all Lichtdruck establishments, two kinds of ink rollers are employed, viz., of leather and of glue. In some establishments, too, they employ two

kinds of ink, but Herr Löwy manages to secure delicacy and vigour at the same time in an impression by employing one ink, but rolling up with both kinds of roller.

Lichtdruck prints, and portraits particularly, are usually varnished; they are first coated with a dilute solution of gelatine, to act as sizing, and then a spirit varnish applied. If the varnish were applied before the print is sized, the varnish would pass through the paper.

A STUDIO SUN-SCREEN.

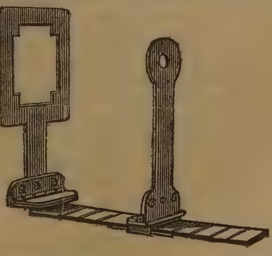
The glass portion of the roof in Herr Fritz Luckardt's studio is surmounted along the edge (outside the studio, of course) by an upright metal screen, six feet high, which serves the excellent purpose of keeping the direct rays of the sun from entering through the roof.



This sun-screen permits the photographer to work with but few curtains, and to employ top-light without fear of the sun. Indeed, in Herr Luckardt's studio, most of the work is done by light that comes through the roof.

MR. H. BARTON'S LENS-FINDER.

There is a brass frame-work, A; this embraces the picture you are to take, and, as you hold it up before you, you make it frame the view you want. On the rod, B, slides to and fro a sort of back sight, C, which has a small opening

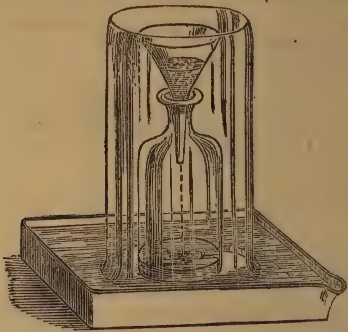


for the eye. You look through this back sight at the frame, A, sliding the bac sight, C, nearer to or further from A, until you see the whole of the view you want. This done, you look at the scale upon the rod, and according where

the back sight rests, so you choose the lens indicated on the scale. The instrument is a very simple one, and any photographer can make one for himself in the same way as Mr. Barton did, viz., by practically trying every lens with the instrument, and noting the result on the rod on which the back sight slides.

COLLODION FILTER.

A DEVELOPING dish is three parts filled with cold water (or, better still, with a saturated solution of common salt, which effectually confines ether vapour) ; a bottle to receive the filtered collodion placed into it, the filter having some cotton-wool placed lightly into the neck. The cotton-wool is saturated with



alcohol, the collodion poured into the filter, then covered with a thin glass beaker. The water in the dish prevents air being admitted or escaping.

BACKING FOR DRY PLATES.

DR. HERMAN FOL says:—My plan is simply this. Whilst developing carbon prints, I lay the tissue, as soon as it comes out of the warm water, flat down upon a waxed plate, and make it adhere everywhere. After a few minutes the gelatine is set with a flat even surface. I take it from the plate and lay it in a dish with common glycerine, where it is allowed to soak for twenty-four hours. It is then taken out, any superfluous glycerine is removed with the squeegee, and the leaves are stored up in a tin box ready for use. The tissue paper and the gelatine are sometimes rather too thin. It is, therefore, more advisable to prepare a sort of chromographic paste purposely, with gelatine, glycerine, and a very small addition of treacle and Indian ink, instead of baryta. It is also well to add some sort of non-communicative red colour, such as alizarine. Strong paper, or even black shirting, coated with this mixture and laid down to set, face downwards, upon a waxed plate, will yield the best backing sheets.

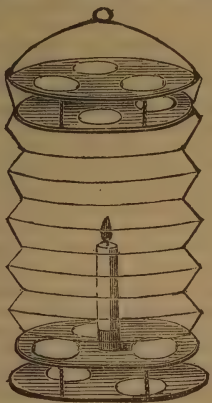
Before putting the sensitive plate into the frame, one need only apply one of these sheets on the back, and press it down so as to expel any interposed air-bubbles. This will be found to succeed most easily if the glue mixture has the proper consistency. After exposure, the backing is stripped off in

the easiest manner, and will serve again and again for weeks and for months. Care must of course be taken to prevent the spring from injuring the gelatine film. This is best effected by interposing a piece of thin cardboard between the spring and the tissue.

I hope that with such an easy plan, suitable either for wet or for dry plate work, blurring will soon be reckoned amongst things of the past.

DEVELOPING TRAYS AND LANTERNS FOR TOURIST PHOTOGRAPHERS.

Dr. Hermann Fol is good enough to send us the following practical hints:— It is important upon a journey to be able to develop a plate now and then, to make sure that all is right with one's exposures. I make my trays simply by taking pieces of stout parchment-paper, about one inch and a half broader in every way than the plate. I fold up the edges of the paper, and fasten the corners with small metal clips. The tray is laid upon a flat piece of board or upon a glass plate, and the developing and fixing solutions are successively poured upon the exposed plate. Such a tray keeps quite firm, even for a prolonged operation; afterwards, of course, it is thrown away; but as parchment-paper is very inexpensive, this is not of much moment. A dozen or two pieces of parchment-paper take very little space in a travelling bag, and cost very little.



The most portable lantern I make by painting over common white paper Chinese lanterns with collodion containing castor oil and fuschine. The top and bottom of the lantern are made each of two thin metal plates fastened together by three small chains. Each plate is pierced with holes, and each pair is fastened to the chains so that the holes do not correspond, and half an inch remains between the two plates. No white light can then find its way out. The upper pair is of course unfixed, and may be lifted out to get access to the candle. This lantern folds up into the smallest possible compass, and when in use perfectly precludes all actinic light without getting hot.

POSITIVE PICTURES ON GELATINO-CHLORIDE, BY THE METHODS OF DR. EDER AND CAPT. PIZZIGHELLI.

Two modes of preparing the emulsion are:—

The first method (without ammonia) yielding pictures which may be bright brown or reddish toned, according to the developer selected; while the same emulsion, if digested for twenty-four hours, can be made to yield pictures having a fine violet-black tone.

The non-ammoniacal emulsion is prepared much after the manner generally adopted for the production of a gelatino-bromide emulsion, the soluble chloride being contained in a warm gelatinous solution, to which the silver nitrate is gradually added, while the mixture is kept in continual agitation. Twenty-five parts of gelatine are dissolved in 200 parts of distilled water, together with 7 parts of sodium chloride, and 6·40 parts of ammonium chloride, it being convenient to allow the gelatine to swell for half-an-hour before applying heat. The gelatine being dissolved, and the solution at 50° C. (122° F.), a silver-nitrate solution containing 15 parts of the salt in 200 parts of water is gradually added with agitation; and it should be noted that it is advisable to warm the silver solution to the same temperature as the gelatinous liquid.

The chloride is deposited, under these circumstances, in a very fine state of division, and the mixture is at once poured out to set, a beaker or drinking glass serving very well as a mould, and external cooling may be resorted to when it is desirable to work expeditiously. The gelatinized emulsion may now be cut into strips, by means of a horn spatula or a strip of glass; but if a more perfect state of division is desired, it may be forced, nutmeg-grating fashion, through a piece of wire netting. In either case the material is tied up in a piece of muslin, and is suspended in a vessel containing a considerable quantity of water, this being changed five or six times, unless a stream can be kept flowing through the vessel. The washing may occupy a period of six to twenty-four hours, according to the state of division to which the emulsion is reduced, the temperature, the frequency with which the water is changed, and other circumstances. This operation being satisfactorily finished, the emulsion is well drained, and is next melted at a temperature of about 50° C. (= 122° F.)

As regards the filtration of the emulsion, fine linen, purified cotton wool, or a special paper which is sold for the purpose at the German photographic stock houses, may be used. The emulsion is now quite ready for use in coating either ordinary glass, opal glass, or paper; but if it is considered desirable to preserve the emulsion in the jelly form any great length of time, it is advisable to add 0·2 parts of thymol or phenol to each 100 parts of emulsion, the preservative agent being previously dissolved in 5 to 10 parts of alcohol.

In preparing ammoniacal emulsion, the same relative proportions of gelatine soluble chlorides and silver nitrate may be taken as in the case of the non-ammoniacal emulsion described in our previous article. To the silver nitrate solution, however, as much liquid ammonia is added as will serve to re-dissolve the precipitate which is first thrown down. The ammoniacal silver nitrate solution is then added to the gelatinous liquid with precisely the same precautions as were detailed in the directions for preparing the plain emulsion; after which all subsequent operations are conducted as already described.

The ammoniacal emulsion may also be prepared by adding ammonia to the previously made non-ammonical emulsion; but the treatment of the silver solution with ammonia is a preferable proceeding, as the precise quantity required is then clearly indicated by the dissolving of the silver oxide first

thrown down, and, moreover, the operation becomes independant of any slight variation in the strength of the ammonia.

It is a noteworthy circumstance that fog is not in any way to be feared in the case of the ammoniacal emulsion; but when a bad sample of gelatine is used, there is a very considerable tendency for the film to frill and separate during the operation of fixing.

When the non-ammoniacal emulsion is digested at a temperature of 35° to 40° C. (95° to 104°F.), it becomes so modified as to give darker images; a digestion of twenty-four hours serving to so change it, that, instead of yielding yellowish-brown pictures when developed by ferrous citrate, it gives violet-black pictures; and, by a shorter digestion, intermediate tints may be attained.

The glass plates should be cleaned with a dilute solution of water glass (say 1 part with 200 parts of water). A few drops of this are poured on a plate, and then wiped off with a clean cloth, the plate being rubbed until it is quite dry. When, however, a quanity of gelatine has been used which possesses a considerable tendency to frill, the treatment with water-glass is not sufficient to prevent the film parting company from the glass, and the chrome alum substratum of Dr. Vogel should be adopted. This is prepared by dissolving 1 part of gelatine in 300 parts of water, and adding 6 parts of a 2 per cent. solution of chrome alum, a few drops of carbolic acid being stirred into each ounce if the mixture is to be kept for any great length of time. The preparation is poured on like collodion, and the plates are ranged in a verticle position to dry.

As in the case of ordinary gelatine plates, it is generally advisable to warm the glasses before coating with the sensitive preparation, this being done by placing them near a stove, or, better still, by using a zinc plate-box which is constructed with double walls, the interspace being filled with warm water. The coating is most easy to perform when plates and emulsion are at the same temperature.

An exposure of one to three seconds under an average negative is generally required when the printing-frame is uncovered in diffused daylight, the ferrous citrate developer being made use of; while thirty minutes at a distance of five feet from a bat's-wing burner may be regarded as an average exposure when gas-light is used.

It is only necessary to give details respecting the two developers already referred to, the most generally useful of these being that containing ferrous citrate; and when the following directions are carried into practice, a developer is obtained which is well adapted for general use.

A solution of 600 parts of commercial citric acid in 2,000 parts of water is prepared, a gentle heat being employed to dissolve the acid; and the liquid is next neutralized, or rather made very slightly alkaline with ammonia, about 300 parts being required for this purpose. Red litmus-paper should be slowly turned blue by the solution at this stage; but if, by inadvertence, too much ammonia has been added, this excess may be readily removed by heating the liquid until the superfluous ammonia has been driven off. The solution in this condition contains, then, the neutral citrate of ammonium, or this salt with a mere trace of ammonia in excess. The next step is to dissolve 400 parts of citric acid in the solution, and to make up the volume of the liquid to double that of the water first used, about 400 parts of water serving for this purpose. The acid solution of ammonium citrate thus prepared keeps well, and, therefore, a considerable stock of it may be prepared, a trace of mouldiness on the

surface being of no importance. The formation of this mould may, however, be prevented by the addition of a few drops of carbolic acid.

The standard solution of ferrous sulphate is next prepared by dissolving one part of the crystallized salt in three parts of water (about one drop of sulphuric acid being added to each four ounces, in order to prevent the deposition of a basic sulphate). It will readily be understood that this solution should be kept in a closely-stoppered bottle, as, when oxidised to a notable extent, it would obviously be unfit for use. The above solutions are mixed, when required, in the following proportions, the small proportion of chloride of sodium being added as a restrainer:—

Ammonium citrate solution	90 vols.
Ferrous sulphite solution	30 ,,
Chloride of sodium solution (1 and 30)	6 ,,

The operation of development is conducted just as in the case of a gelatino-bromide plate, and the image should acquire the necessary intensity in five or ten minutes. Several plates may be successively developed with the same solution.

As sodium chloride is a very powerful restrainer, care must be taken not to increase the proportion unduly, but at the same time it is interesting to observe that a notable increase in the quantity of this salt present in the developer causes the production of blacker tones than when only a normal proportion is used. Some other soluble chlorides may be employed instead of the sodium compound, but no advantage appears to result; the soluble bromides are, however, much more energetic restrainers than the chlorides.

A large increase in the proportion of the ferrous sulphate solution retards the development, and gives pictures in which the image appears to be more deeply seated in the film than when the ordinary solution is employed; while an increase in the proportion of the ammonium citrate solution has but little effect, excepting to occasion a somewhat darker tint. The effect of diluting the developer is to diminish its activity, and thin images generally result.

The addition of gallic acid to the developer leads to the production of sepia-brown or dark olive-brown tones; the former being obtained when the non-ammoniacal emulsion is used, and the latter in the case of the ammoniacal emulsion. When gallic acid is used, the developer may be made as follows:—

Ammonium citrate solution	90 vols.
Ferrous sulphate solution	30 ,,
Sodium chloride (1 and 30)	6 ,,
Gallic acid (1 and 10)	10 ,,

The gallic acid developer acts more energetically than the ordinary developing solution, and the exposure may be consequently reduced to the extent of one-third.

The fixing of the pictures is best performed in a tolerably dilute solution of sodium hyposulphite, one part to ten or twenty of water being a convenient strength.

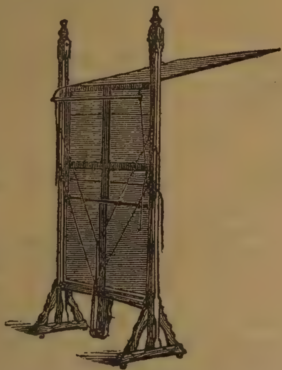
Those who wish to try the hydro-kinone developer with the chloride emulsion, should refer to the PHOTOGRAPHIC NEWS, vol. xxv., p. 470.

The chloride emulsion process appears to possess very notable advantages over the bromide method for the production of positives on paper, and the paper may be coated with emulsion just in the same way as carbon tissue is prepared, the plain paper being drawn over the surface of the melted emulsion.

Another method adapted for the production of small quantities is to rub a glass plate with French chalk, and coat with emulsion. After this has set, a sheet of damp paper is squeegeed down upon it, and when all is dry, the gelatino-chloride paper may be stripped from the glass, the French chalk serving to prevent adhesion.

MR. MIDWINTER'S SHADOW SCREEN FOR PORTRAITURE.

It is a screen of calico with a canopy at the top, bending over at right angles above the sitter, this canopy, of a blue or slate colour, being heightened or lowered at will to suit the height of the sitter.



The structure consists of two side screens, one above the other, and an over-hanging or head screen. Of the two side screens, the lower one remains stationary, but the other one, which overlaps, may be made to rise to its full extent; in our sketch it is half-way up. The structure may, in fact, be raised to 8 feet, or lowered to 4 feet. The head screen rises and falls with the side screen, and, provided with the lever arrangement shown in the sketch, may be made to assume any angle. The lower cord raises or lowers the side screen, and the upper cord regulates the angle of the head screen or canopy.

DUFOUR'S CHEMICAL ACTINOMETER.

The principle of my apparatus, says Professor Dufour, consists in counteracting the varying action of light upon a mixture of chlorine and hydrogen by an electrical current of varying intensity, but capable of being measured at any moment. This current effects the decomposition of an amount of hydrochloric acid equal to that which is produced by the action of light on the mixture of chlorine and hydrogen.

The apparatus consists (fig. 1, page 172) of two glass bulbs, A and B, similar to those of Rumford's thermoscope, but rather thicker. Into the two lateral necks t and t' of the bulb A are fixed two carbons which act as electrodes. The tube T enters into this bulb, following its curvature; the same bulb contains a small quantity of hydrochloric acid.

The second bulb, B, which is blown on to the other end of the tube, T, contains sulphuric acid. By means of a glass stop-cock, R, the communication between A and B can be completely shut off. The tube T is placed in an inclined position, as shown in the figure. The part *a b* has an interior diameter of only one millimetre, and it is graduated to cubic millimetres.

To prepare the sensitive mixture of chlorine and hydrogen which is to occupy

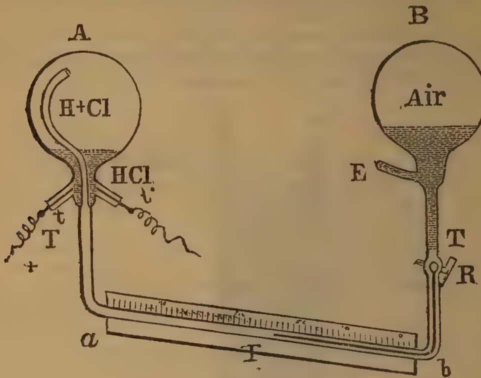


Fig. 1.

the upper part of the bulb, A, and on which the light is intended to act, an electric current must be passed for several hours; this decomposes the hydrochloric acid, saturates it with chlorine, and at the same time diminishes the strength of the acid. We thus obtain a liquid capable of rapidly absorbing

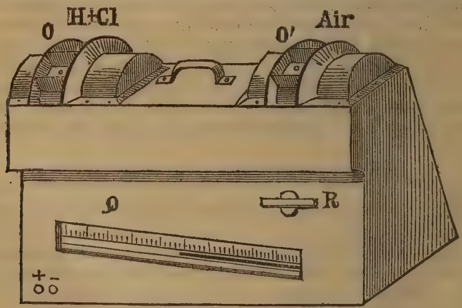


Fig. 2.

gaseous hydrochloric acid, and having above it a mixture of chlorine and hydrogen. When the mixture has attained the requisite sensitiveness, sulphuric acid is introduced into the bulb A, by means of the side tube, E; this tube is then closed with the blowpipe. The whole apparatus must be carefully

arranged so that the volume of air remaining in the bulb B may be equal to the volume of the sensitive mixture of gases which is in the bulb A.

The entire instrument is enclosed in a box blackened on the inside (fig. 2). The light is admitted by the two openings O and O′, which can be made to vary both in size and in position. The stopcock R is within reach of the hand of the observer, and the tube *a b* appears on the outside of the box, being inserted into a groove cut for the purpose, and lined behind the tube with black cloth. When an observation is to be taken, the two openings, O and O, must have the same size and the same position; under these circumstances, the instrument is not affected by variations in temperature, which produce equal expansions or contractions of the gases containing the two bulbs.

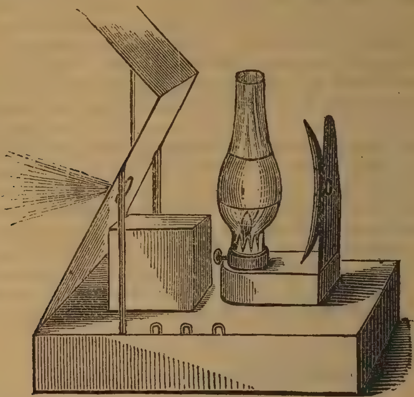
By the action of light, part of the chlorine and of the hydrogen which are in the bulb A are caused to combine to form gaseous hydrochloric acid, which is then absorbed. By this action there is induced an increase of pressure and expansion of volume in A, and the column of sulphuric acid is displaced from right to left. To counteract this displacement, an electrical current is passed through the solution of hydrochloric acid; when the current decomposes a quantity of hydrochloric acid equal to that which the light is continually forming by the combination of chlorine and hydrogen, the column of liquid remain stationary. To measure the intensity of light, it is therefore now only necessary to measure the intensity of the current which suffices to produce this equilibrium.

RETOUCHING FOR BEGINNERS.

Mr. Henry Morgan says:—For the benefit of the beginner, I think it is necessary to commence the subject with the description of negative most suitable to work upon, the pencils to use, &c., so that he shall not get disheartened with his first few strokes caused by an unsuitable bite. I will give him the preliminary requirements, and, having started him, he will be in a fair way to learn, with patience, the beautiful art, for such it is when worked wisely, but not too well.

The negative most suitable for retouching is one which is well exposed (not flat), but with full detail; such a negative is usually got with the first development if the negative bath, collodion, &c., work in unison; if it be much under- or over-exposed, it must be left to the more experienced, but such a negative as the above is the one for the beginner to start with. The varnish should be hard (more especially for gelatine plates). The best medium I find is this: to one ounce of spirits of turpentine add ten grains of gum-dammar and a few drops of oil of lavender (the latter merely to give it a pleasant smell); drive a cork tightly into the bottle; cut it off close to the neck; then make a hole in the centre, which will allow a little of the solution to work out when pressed (you are not bothered with upsetting it then); apply a very little of this to the part to be retouched with the finger; rub round with a circular motion, until you find it slightly sticky; you will find you can work from the lightest touch to the deep shadows with hard pencils; soft ones are liable to crumble, and leave specks where they are not wanted; this can be used with safety on gelatine plates, before varnishing, with a very pleasing result, and the finish put on it after varnishing. Faber's HB to HH and HHH are most useful, and to sharpen them, glue some fine emery paper to a piece of wood, like a razor strap; rub the pencil on this until you get a fine, longish point. I need not mention the desk; any ordinary desk will do

only do not use a mirror for reflecting the light; it is a mistake, and only tries the eyes; use white paper for wet plates, and for dry, if they are thin and rather yellow, use paper of a rather bluish or greenish tint, and less light—or, better still, retouch through very thin opal; this gives more body to gelatine negatives.



Before starting, please remember the three P's—Patience, perseverance, and practice; bear in mind these, and success is certain. Do not be in a hurry to get over the face with dots and lines, piling on the lead with the idea of making a grand stipple; if you do, you will be sorely disappointed, when you fancy it finished; but take it easy. Commence at the right hand side of the forehead, with light, circular strokes through the imperfections, from right to left, blending, as you go, the uneven parts with their surroundings; do not touch on any part but these; continue to the temples; turn the negative, and work the cheek, the deep shadows under the eye, and about the nose and mouth; do not obliterate, but soften them; continue working in the direction of the facial lines, always inclining them inwards, which gives rotundity. If you follow these instructions, you will find the dirt, as it were, worked out of a face which is sufficient to produce a good print. A considerable amount of practice is required to give what is termed a stipple, and is produced by various systems of working. A very fine effect is produced by dots alone, another by dots with tails, and by crosses curved; but the beginner must not tread out of his path until he has mastered his first lesson, and can work on a face without leaving patchy traces of the pencil; then he can try his hand on any fancy work he likes, and can stick to any method he thinks proper; but the least work, with the most effect, is to be aimed at. In using colour for stopping out holes, &c., that will not take sufficient lead, neutral tint for wet, and olive green for dry negatives with yellow films. Do not be disappointed with your first attempt; I promise you plenty of troubles with the different kinds of negatives, but plod on. With my first lessons I used to watch the retoucher attentively, and gaze on in wonder and admiration to see him, with apparently careless curves, blend and stipple most beautifully, which seemed to me a mystery then; but as I stuck hard at it, I found,

when I had mastered the strokes, that I was able to work either very smooth or stipple; then it was safe to employ any system. If the work on a negative is not satisfactory, you can take it off with a handkerchief, moistened with the least drop of the medium, and commence again.

I must warn the beginner not to pile on the work, but work as lightly as possible, and have patience—he will soon see the effect—not as I did. When I first commenced, I piled on the work—too much lead, and no effect. I was going to say the negative was heavy with the lead. However, I could not put any more on it; and, as I have, you will have to buy your experience.

For those who would like to practise at night, a certain kind of light is required; this can be produced easily, which will be seen in the sketch (page 174).

An ordinary tin lamp, with reflector, costs about two shillings, which is placed behind the desk. Use a piece of opal (the dead side) for the lamp to reflect on; place a small box, or anything handy, under the aperture, so as to bring it within an inch of it; by varying the light you can suit it to thick or thin negatives. I do not find it injurious to the sight; but it would be advisable for any one to wear spectacles with a blue or green tint, for without good eyesight the photographer is lost.

SUNSHINE AND SHADOW IN PHOTOGRAPHY.

Mr. H. P. Robinson writes:—I have come to the conclusion that, although a large majority of out-door photographs are taken in sunlight, very few of them really represent the "merry sunshine," or what has been still more admirably called, "Nature's smile."

There is no doubt that to represent sunshine quite completely, colour is necessary; but the effect of sunlight can be very well suggested without its aid. Turner is famous chiefly for his colour, but careful study of his works will reveal the perfect subordination of colour to light and shade. This is shown in the fact that all his pictures engrave well. Ruskin, who always preaches colour, in one of his earlier works has shown that colour is not indispensably necessary to the adequate representation of all the phenomena of nature, especially sunshine. Turner, as usual, is his theme. "I have before shown the inferiority and unimportance in nature of colour, as a truth, compared with light and shade. That inferiority is maintained and asserted by all really great works of colour; but most by Turner's, as their colour is most intense. Whatever brilliancy he may choose to assume is subject to an inviolable law of chiaroscuro, from which there is no appeal. No richness nor depth of tint is considered of value enough to atone for the loss of one particle of arranged light. No brilliancy of hue is permitted to interfere with the depth of a determined shadow. And hence it is that engravings from works far less splendid in colour are often vapid and cold, because the little colour employed has not been rightly based in light and shade. Powerful and captivating and faithful as his colour is, it is the least important of all his excellences, because it is the least important feature. Were it necessary, rather than lose one line of his forms, or one ray of his sunshine, he would, I apprehend, be content to paint in black and white to the end of his life."

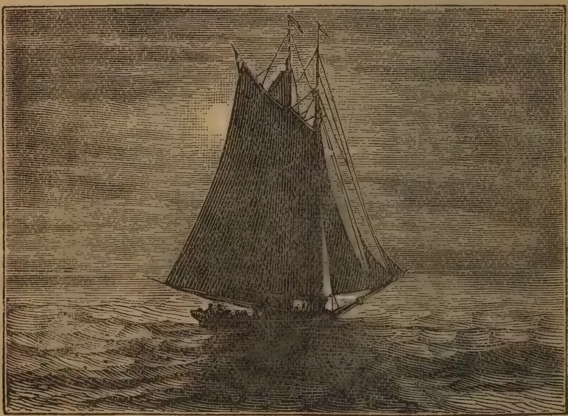
How is it, then, that photographs so seldom represent sunlight, when a great artist like Turner would rather give up his colour than lose the sunshine he could always get in black and white? I suspect it is that we do not give the massing of the light and shade in our pictures sufficient thought. A quantity

of flashes and spots of light scattered over the picture will never suggest anything but spots of light; but if a breadth of sunlight can be contrasted with a breadth of shade, but of unequal quantity, sunlight will be suggested, especially if the composition of the view allows of distinct and vivid cast shadows.

There is another effect of sunlight that has never been well given in a photograph—I mean the effect of passing clouds over a sunlit landscape. To render this effectively, the view must be somewhat extensive, and the exposure short. There should be no near foreground, especially of leaves or other objects that would be affected by wind, for the best effects of this kind are accompanied with strong breezes. These subjects are, I know, quite possible. A few weeks ago I got a capital example of it in North Wales, but the negative was spoiled as a picture by the movement of an ash tree which came rather large in the foreground, and was destroyed at once. I have also found the shadows of clouds on the sea to come very perfectly. In connection with the destroyed negative to which I have just alluded, I may mention that I find it a good plan, when a negative has some radical defect in it, to destroy it at once. If you stop to think, you will persuade yourself to keep, and perhaps print and exhibit, a picture which never should have passed the development stage of existence.

On the subject of shadows, Mr. Robinson says :—

The illustration will give some idea of what I want to convey. I have



put the sun in to show the source of light; but, in a photograph, or, indeed, any other kind of picture, the sun itself would be better hidden behind the sail of the boat. In this arrangement we get the highest light opposed to the strongest dark, a very favourite form of composition among painters, and an excellent expedient for securing powerful effects. By placing the extremes of light and dark in juxtaposition a key-note is secured which accentuates the mass and contour of the object so relieved in the most powerful way, and gives the utmost limit of effect. By opposing—

to borrow an illustration from a sister art—the extremities of the gamut of light and shade, the artist enables the eye to gauge and be sensible of the tenderest tones and semi-tones in other parts of the picture. By bringing the darkest mass of the picture, whether it consists of a boat, or a ruin, or a tree, against the lightest part of the sky, the value of each is enhanced, and a delicate sense of atmosphere and space is gained that would be difficult to produce by any other device.

It might probably be said that there are great difficulties in the way of obtaining landscape negatives with the lens turned towards the light. Well, there are difficulties. But what photographer, worthy of his camera, objects to difficulties, or would be deterred by them? To me, the taking of a subject by photography that presents no difficulties is one of the most tame and insipid ways of passing the time I know. A true musician prefers the violin to the barrel-organ, although it is infinitely easier to grind a tune out of the latter, than to squeak a melody out of the former. Now what are the difficulties that present themselves The lens, acting as a window as well as a lens, might admit sufficient light to slightly fog the plate; but I do not see any objection to a slight veil over the shadows if the negative prints the effect I require, and a good deal can be done by shading the lens during exposure. There are some photographers who care more about the mechanical or chemical beauty of their negatives than of the pictorial result. They think more of the means than the end. I differ from them. I don't want to preach up the beauty of fog; but I have seen prints from some fogged negatives containing beauties that I don't think could be given by negatives with clear glass in the darks, or in any other way.

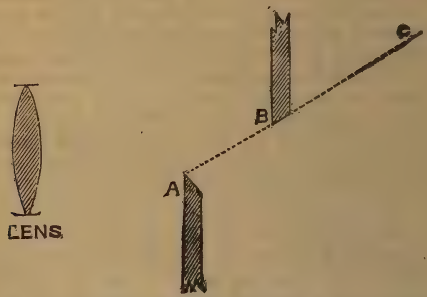
ON INSTANTANEOUS SHUTTERS.

The Earl of Rosse, F.R.S., writes:—Although the designs for instantaneous shutters which have been before the public are very numerous—so much so as to lead one to suppose that it is impossible for a new one to be proposed—I venture to suggest a slight modification which appears to me to be free from a defect generally attributed to the simple form of drop-slide such as is sold by Messrs. Watson and Son, of Holborn.

I find that it is very generally said, with regard to drop-slides in front of the lens, that, owing to the acceleration of the velocity of the slide in falling, the exposure given to the foreground of the picture is shorter than that given to the sky and to the upper portions of the picture, which usually require the shorter exposure; and it has been sought to substitute for this drop-slide one at the opposite side of the lens inside of the camera, at a great sacrifice of simplicity. Now if, in Watson's drop-slide, we replace the upper jaw of the opening (which lies in the same plane with the lower jaw A and that of the slide), by one (B) advanced forward from the lens, the opening will have

an increasing apparent breadth, as seen from the centre of the lens, from the top, towards the bottom of the picture, and thus an approximate correction, or even over-correction, to the variatic of exposure through acceleration, may be obtained. If we take the par..cular case where the relative position of the jaws is such that the opening is apparently just closed, as seen from the centre of the lens at the starting point of the slide, the apparent breadth of the opening will increase directly as the distance moved; on the other hand, the velocity is, as before, as the square root of the distance moved, and consequently the exposure increases instead of diminishes, in proportion to the square root of that distance. Hence, by this simple modification of the drop-slide, the defect commonly attributed to it would appear to be at once removed.

An increase or diminution of the exposure over the whole plate, preserving at the same time the relative exposure of the parts unchanged, may, of



course, be given by advancing B along the line A B C, towards C or A, and a variation in the relative exposures upon the several parts of the plate by moving the jaw B forward or backward in a direction perpendicular to the plane of the slide, so that the exposure of the centre of the picture may remain unchanged.

With reference to the risk of a slight motion being imparted to the camera by a drop-slide rigidly connected with it, I may remark that there will undoubtedly be a tendency for the front of the camera to rise when relieved of the weight of the slide, on being set free by a trigger or catch; but if the slide be held up at its starting point free of all stops, by a thread held between the fingers or otherwise, independent of the camera, no appreciable disturbance need arise when the exposure is given by the releasing or cutting of the thread.

HOW TO MAKE EMULSION IN HOT WEATHER.

THIS is what Mr. A. L. Henderson says:—Numerous complaints have reached me within the last few weeks of the difficulty experienced in preparing emulsion and coating plates; one is very likely to blame everything but the right, but doubtless the weather is the culprit.

I have always held that to boil gelatine is to spoil it, and, even when emulsification is made with a few grains to the ounce and cooled down before adding

the bulk, the damage is done to the smaller quantity, so that when mixed it contaminates the whole mass; moreover, it is impossible to set and wash the gelatine without the aid of ice.

I have lately made several batches (with the thermometer at 92° in the shade, and the washing water at 78°) as follows:—

Hard gelatine	½ ounce
Water	2 ounces
Alcohol	2 „
Bromide ammonia	150 grains
Liquor ammonia ·880	60 drops

When all is thoroughly dissolved and of about 120° temperature, add, stirring all the time—

Nitrate silver	60 grains
Water	¾ ounce
Alcohol	¾ „

Then again add—

Nitrate silver	140 grains
Water	1 ounce
Alcohol	1 „

Both solutions being warmed to about 120°.

My object in adding the silver in two quantities will be obvious to many—viz., when the first portion of silver is mixed, nitrate of ammonia is liberated (which is a powerful restrainer), and the bulk of the solution being increased, the remainder of the silver may be added in a much more concentrated state.

The alcohol, both in the gelatine and silver solutions, plays a most important part:—(1). It prevents decomposition of the gelatine. (2). It allows the gelatine to be precipitated with a much smaller quantity of alcohol (say about 10 ounces).

After lettting the emulsion stand for a few minutes to ripen, I pour in slowly about eight ounces of alcohol, stirring all the time, and keeping the emulsion warm; the emulsion will adhere to the stirring-rod and the bottom of the vessel in a soft mass, and all that is now required is to pour away the alcohol, allow the emulsion to cool, tear it into small pieces, wash in several changes of cold water, make up the quantity to ten ounces, and strain; it is then ready for coating.

By this formula I have no difficulties whatever; my plates set in about five minutes, and their quality is such that, "unless a better method is devised," I intend to adopt it in all weathers.

One word more as to the alcohol. It will prevent the decomposition of gelatine when boiling goes on, or when in the presence of foreign salts; no flocculent deposit is noticed in the alcohol after the emulsion has been precipitated.

REMOVING SILVER STAINS FROM CLOTH, ETC.

BY W. E. DEBENHAM.

CYANIDE of potassium is the agent usually employed to remove silver stains, and it is generally efficacious for the purpose; but on some materials, black cloth particularly, the wretched cork-coloured patch which it causes is worse than the original dark brown or blackish green silver stain which it was intended to remove. The iodide of potassium, besides being comparatively

harmless as a poison, is free from this objection, and, if used in the following manner, will be found even more efficacious.

Make a saturated solution of iodide of potassium and apply to the stain, leave it for a night, and in dry weather it will be found to have crystallized, and may be brushed out, carrying the silver with it. The strong solution has converted the metal into iodide of silver, and then dissolved this in the excess of alkaline iodide. If the weather is too damp for the salt to crystallize, the cloth must be dried at a fire before brushing.

If the stain is so unusually strong as not to be perfectly removed, the operation may be repeated, or a little iodine—say from 10 to 20 grains to the ounce of iodide—may be dissolved in the solution. The discolouration which the iodine itself causes may be removed by treatment in the same manner with saturated solution of hyposulphite of soda.

Among the materials which have been successfully treated in the manner above described are black cloth, velvet chair covering, and Brussels carpet.

COMPOSITE PORTRAITS.

During the past three years, Mr. Galton has made good progress in his method of so blending several portraits as to obtain an average of expression.

Mr. Galton's older form of apparatus for securing composite portraits is illustrated by the accompanying cut.

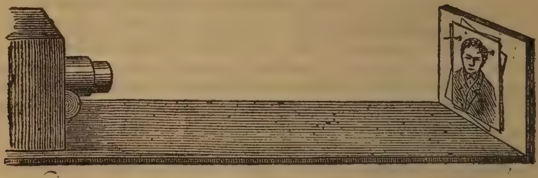


Fig. 1.

A series of paper prints are so threaded on pins that the point at which the two lines shown in fig. 2 intersect, shall exactly coincide in the case of every

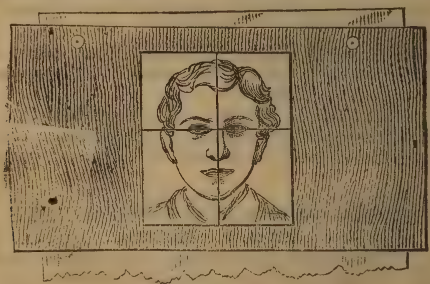


Fig. 2

print. The horizontal line cuts the pupil of each eye, while the vertical line is drawn mid-way between the pupils, and the time of exposure is divided into as

many equal fractions as there are portraits to be averaged, all these fractiona exposures being made on the same sensitive plate.

Mr. Galton now adopts a third register line, for securing proper superposition of the portraits, this being drawn horizontally through the mouth, and all pictures are so enlaged or reduced as to make both intersection points coincide. Instead of working with paper prints, the original negatives are now used, each one being separately placed in a holder, which is attached to an arrangement which resembles the mechanical stage of a microscope, this stage being fixed at right angles to the base-board of the copying camera (A, fig. 3).

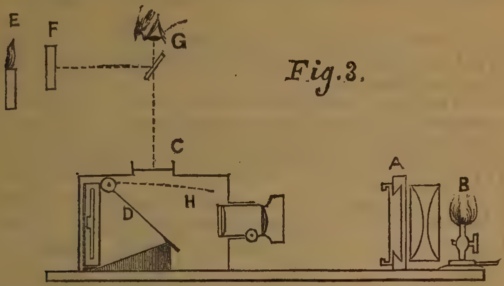


Fig.3.

A gas lamp, B, behind the negative, serves as a source of light; and a condenser is used, together with a diffusing plate made of ground glass. The focussing screen, C, of the camera is situated at the top, a mirror, D, being so arranged that it may either serve to deflect the rays towards the focussing-screen, or, when it is turned upwards on its hinge, as shown by the dotted line H, allow them to fall directly on the sensitive plate. It is obvious, that if the register line were drawn or engraved on the focussing-sceeen, it would be merely necessary, in the case of each component picture, to so arrange the camera and mechanical stage as to secure coincidence of the register points, and to give each picture its proper fraction of the total exposure. It was found, however, in actual practice to be much better to make use of apparent bright lines on the ground glass screen, rather than actual dark lines, and this end is attained by viewing an illuminated transparency so that the eye refers the image to the screen; the well-known camera-lucida ordinarily used with the microscope being used.

Let E be a candle so placed as to illuminate a negative of the rigistering lines placed at F. A piece of polished glass having its sides parallel, G, serves to reflect a portion of the rays from the negative, F, into the observer's eye, while the greater portion of the rays from the focussing screen, C, pass through the same glass without being deflected. Under these circumstances the bright lines of the negative, F, appear to the observer as if they were the focussing screen. A cap covers C during exposure.

The general direction of the camera-lucida arrangement is at right angles to the longitudinal axis of the copying apparatus, it being represented differently in the drawing, in order to make its principle clearer; and when in use, the whole apparatus is tilted over a little on one side for convenience in working.

Among the pictures shown, we may mention a series of seven criminals, and a

composite taken from them; and in this case it was almost as if we looked on the ideal of a vicious face, although it was soft, smooth, and free from the individual markings of vice which often appear to arise rather artificially than to exist naturally. The composite seemed to represent a vicious man who had not actually fallen, rather than a hardened criminal.

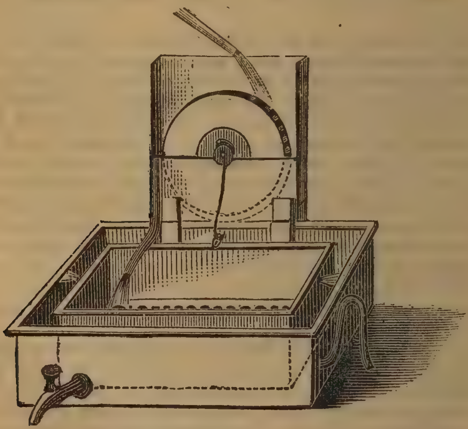
To the physiognomist, the ethnologist, the physician, and the teacher of morality, composite portraiture will open up new fields of study.

SCHURER'S APPARATUS FOR WASHING PRINTS.

A small overshot wheel is actuated by a stream of water as shown in the drawing; and the spent water is led by an out-flow pipe into a rectangular tank having a perforated bottom.

This is so set in the larger tank that it can rock freely on conical bearings, these being represented on each side of the diagram; and the requisite motion is communicated to the tank by a crank and connecting rod which are attached to the axis of the water wheel; the outer vessel being provided with the usual intermittent syphon.

The prints, previously rinsed in order to remove loosely adherent hyposulphite of soda, are placed in the inner or perforated tank; and the water being turned on, this tank is kept in continual motion. When it becomes



filled, the syphon shown at the right hand side of the figure comes into action, and the whole of the water is rapidly drawn off, after which the vessel soon becomes once more filled.

The rocking motion communicated by the water-wheel serves to effectually prevent the massing together of the prints, and ensures a very rapid elimination of the hypo.

Jottings.

THE following seems to be a modification of the Pellet process. Copies of drawings or designsi n black-and-white may be produced upon paper and linen by giving the surface of the latter two coatings of—

Gum-arabic	7 to 10 grammes
Citric acid	2 to 3 "
Iron chloride	4 to 6 "
Water	85 cub. centimetres.

The prepared material is printed under the drawing, and then immersed in a bath of yellow prussiate of potash, or of nitrate of silver, the picture thus developed being afterwards put in water slightly acidified with sulphuric or hydrochloric acid.

M. Levitsky, the court photographer at St. Petersburgh, has gone back to wet plates in his electric studios; he avows that an exposure of not more than four seconds is necessary, but he works with a very strong light, which is reflected upon the sitter from all sides.

Dr. Steinheil, of Munich, has a lens of novel construction, termed an Antiplanet; it is composed of two lens systems, possessing similar faults and aberration, which are neutralised by their juxtaposition. It is destined both for landscape and portraiture, and is, says our friend Dr. Eder, to be distinguished for great power and depth of focus.

According to a communication to the *Chemical News*, photographers appear, of all persons in the world, most favourably situated for the manufacture of hair-dye. Although many of them may not be aware of the fact, they possess just the very ingredients necessary to its preparation in the highest perfection. Nitrate of silver solution alone gives a dull reddish-brown tint after a time we are told, "particularly noticeable when the light falls obliquely;" but an "instantaneous dye" is obtained by treating the hair first with a solution of pyrogallic acid, made strongly acid with acetic acid, and, when nearly dry, using a solution of nitrate of silver with a little copper (sulphate) solution added. We are further informed that all shades of brown and black may be obtained by varying the strength of the pyrogallic acid. After this, we shall expect no more grey-headed photographers.

It is generally accepted that iodide of silver is more sensitive to the violet end of the spectrum, and bromide of silver to the red; yet Dr. Huggins, who has for some time past occupied himself in depicting the spectra of the stars, and in examining by photography only the blue, violet, and ultra-violet rays, employs, strange to say, bromide of silver plates.

Mr. Harvey Barton selects square-faced bottles for his travelling apparatus, and generally encases them in thick flannel or cloth. Such bottles pack well, and not only does the flannel casing prevent breakage, but supplies the means, in summer time, of cooling down the liquids contained therein; since it is only necessary to damp the flannel in order to set up active evaporation, which reduces the temperature of the contents by several degrees.

The facility which photography offers of depicting a scale in feet or inches, cutting through or bisecting the object depicted, is a quality likely to find useful application in science. In discussing the aid that photography lends to the study of anthropology, we showed how the measurement of a skull might be

easily determined by photographing, first of all, a black and white scale against a background of black velvet, and then, without altering the focus of the lens, securing a second picture upon the same plate, of the skull, which is suitably adjusted in position, in place of the scale.

By the same plan, the diameter of most solid objects, no matter what their form, may be measured without difficulty. It only rests with the photographer to say what particular section, or rather imaginary section, he desires to measure, and then he must take care, when he substitutes the scale for the object, that the section in question is in the same plane as that occupied by the scale that he has withdrawn. Of course, camera and object-stand must be levelled with accuracy; but even if the object is not represented with absolute truth, it must be remembered that the image of the scale exhibits corresponding defects.

A studio of the olden time, we take, from Cruikshank's *Omnibus*, this time of a pictorial nature. It is probably the only picture we possess of a studio of forty years ago. One assistant is shown watch in hand, timing the exposure,

and another seems engaged in burnishing a silver plate. Two pair of sitters are waiting their turn, impressed, meanwhile, with the wonders of Daguerreotypes. The head-rest is much the same as that employed now-a-days, and to the head-screen is attached a cord by which the top-light may be modified. A peep through the door shows us the laboratory adjoining, in which a spirit lamp suggests the mode of development.

A saturated solution of hyposulphite of soda applied with a cloth or brush is mentioned by Dr. Davenport, of the Massachusetts College of Pharmacy, as one of the best means to remove all tarnish from the surface of silver. A solution of cyanide of potassium, as most people know, is also useful for the same purpose; but, unfortunately, the silver always seems to tarnish more rapidly after its application. In any case, hyposulphite, being comparatively harmless, should be a more popular compound to use.

Coffee'd cotton will be found most effective for draping models for the camera; moreover, coffee is a dye that is easily obtained. The other day we saw some delightful pictures, taken out of doors, of a young girl whose lighter garments were rendered with exquisite softness and detail, the garments being a handkerchief worn across the chest, and an apron of white cotton just tinged by dipping in a solution of weak coffee.

For retouching opaque objects, either by day or night, a decanter of water will be found exceedingly useful for condensing the light upon one's work. Artists, when drawing upon wood, find a simple lens of this kind of wonderful assistance in illuminating their fine pencilling.

A summer wrinkle for wet collodion workers in the studio. In very hot weather, when thin collodion films are apt to yield flat unserviceable pictures, German photographers often refrain to expose the thinnest end of their triple carte plates, only taking two portraits upon each.

Dr. Eder communicates a simple method of transforming gelatino-bromide negatives into gelatino-chloride pictures, which is very similar to M. Zuccato's method already published in our columns. The developed and fixed image is put into a solution of—

Bichromate of potash	1 part
Hydrochloric acid	3 parts
Water	100 to 150 ,,

when the change is quickly brought about, the chloride of silver film that results being much more easily intensified or weakened than the original bromide. The colour of a chloride film, as has already been pointed out, may also be made to assume various tints.

Cut or tear out a square of paper, one side being equal to the diameter of your largest stop; halve this by folding from corner to corner, and fold the triangle thus obtained so that both the acute angles of the paper coincide; after which, divide at the fold. Either one of the two equal sides of the triangle thus obtained represents the diameter of a stop, requiring double the exposure required by the largest. Fold once more, so that the acute angles coincide; and again divide, when either one of the equal sides will give the diameter required for an exposure of double that required with the last-mentioned stop, or four times that required by the first. By continuing to halve the right-angled triangles as above described, the diameters required for the following exposures will be obtained: 1, 2, 4, 8, 16, 32, 64, 128, and so on, a series quite comprehensive enough for all practical purposes.

The washing of silver prints is attracting considerable attention in Germany just now. It is the custom in many high-class establishments for assistants to wash each print separately in seven or eight changes of water before it is put into its nightly bath. In the morning the print is again rinsed separately in several waters before being finally dried.

This is the law in Germany touching ownership of the negative, according to a recent decision of the courts. A customer can only be regarded as the

owner of the negative in the event of his paying a price for it, and having previously stipulated for its possession. Otherwise the negative is not the property of the customer, but the latter may insist on its destruction by the photographer.

Gelatino-bromide workers must not forget that some samples of white paper are so phosphorescent as to ruin plates if brought into contact with them, after recent exposure to light; and, as the extent to which bodies are phosphorescent depends on very minute physical differences, we were hardly surprised to find a few sheets of paper in a ream, which were, for plain white paper, very strongly phosphorescent, while the bulk was not above the average.

"The lady's developer" is the term applied to ferrous oxalate, on account of its non-staining propensity. It is certainly very agreeable to develop with clean fingers, and the property is one by no means to be disregarded.

Dr. Van Monckhoven's method of preparing sensitized paper which will keep, is to add to the silver bath as much nitrate of magnesia as it contains nitrate of silver. Thus he makes up a bath of—

Water	100 cub. cents.
Silver nitrate	12 grammes
Magnesia nitrate	12 „

and after every whole sheet is sensitized, he adds a further 2 grammes of silver, but no more magnesia.

Mr. W. H. Deering, F.C.S., suggests that possibly Graham's dialysed silica, which is free from salts, and which may be regarded as mineral albumen, could be employed for a substratum. A dilute solution applied to a glass surface could be coagulated like albumen, at will. A trace of alkaline carbonate —say carbonate of soda or potash—brings about this coagulation, as does also a moderate heat.

Mem. in developing.—Rinsing out the developing dish before using it again is not always sufficient to remove deposits, which frequently cling to bottom and sides with remarkable tenacity. A sponge kept specially for the purpose, or a clean rag, should always be used prior to the last rinsing.

Mr. William Sawyer, the well known editor of *Funny Folks*, writes:—"I was pleased with an application of photography which I saw at a party the other night. It was new to me, and may be to some readers. A gentleman, on being asked to sing, produced from his pocket a little case which contained his music, photographed down to the size of note-paper. He had duplicate copies of each song, and handed one to the accompanyist, singing from the other himself. The expedient saved all the bother of bringing a roll of music, unfolding it, collecting it again, and so forth"

Photographers who employ the tungstate of soda toning bath generally experience some difficulty in recovering gold from their old solutions. Herr Fritz Haugk suggests shaking up the latter with a little commercial aniline, and then, if the liquid is allowed to stand from twelve to twenty-four hours, the gold therein will be precipitated.

The *Practical Photographer* contains, by way of frontispiece, an excellent example of "statuary from life." It is the bust of a lady on a pedestal, to all appearance the work of the sculptor, except that the face, half turned towards you, exhibits the unmistakable warmth and vitality of life. The illusion is very perfect, no signs of printing-in being visible, while a clever trait is the contrast afforded by the rough work of the pedestal, and the fine, smooth modelling of the features.

The *tour de force* calls to mind another clever suggestion made by Mr. W. Woodbury some years ago. This was a plan for photographing a lady under a glass case, like a Dresden shepherdess. With an ordinary carte-de-visite lens, a narrow glass shade twenty-two inches high will suffice for the purpose. A picture of the glass case, backed with black velvet, is first secured on a plate, and subsequently a standing portrait is taken upon the same film, and within the dimensions of the glass case image. By registering, first of all, upon the focussing screen, the image of the portrait, and also of the glass, there is no difficulty in getting them to coincide. On development, the model appears to be under the glass.

For the convenience of printing-in skies, Mr. Harvey Barton, of Bristol, binds paper round the lower part of his sky-negative so as to form a sort of bag. Into this bag, or envelope—coming about half way up the negative—the landscape print is put, which is thus kept in proper position to receive the sky impression. When natural skies are wanting, an aqueous solution of gamboge applied to tissue paper is made to supply their place.

A hint in washing from Mr. Barton's establishment. The prints are prevented from rising to the surface of the washing trough by a string net stretched across at a point below high-water mark. Thus the pictures never cake together, or, if they do, are separated again every time the water rises above them.

A simple way of waterproofing cardboard. Mix four parts of slaked lime and three parts of skimmed milk with a little alum. Apply two coatings of the freshly prepared compound to the card.

When gelatine plates are used wet, Dr. Van Monckhoven recommends their development with iron, the developer being kept in constant agitation, and a camel's hair brush moved to and fro over the surface of the plate. The film will then develop as quickly as a dry one, but the operations of fixing and washing occupy longer.

Laine claire, a Paris photographer told us the other day, he preferred his lady-sitters to wear.

Negatives that are to be stripped from the plate, or collodio-chloride positives required to be detached from glass, are best prepared, says Herr A. Franz in the *Correspondenz*, by using a three or five per cent. solution of india-rubber in benzole, which is applied before the collodion or gelatine. This substratum makes the process of stripping very easy. The finished negative is put upon a levelling stand, a solution of gelatine is poured over, and when this is dry, the whole film may be readily separated from the glass with a knife.

A correspondent who has considerable experience in retouching upon gelatine, writes :—"The best medium for retouching—and I have tried many—is the 'Autotype.'" A little taken on the tip of the finger is smeared on thinly over the part to be pencilled, and allowed to remain an hour, which may be lessened by gently warming. After working with lead pencil or brush, heat thoroughly, and varnish with any thin varnish. I often print without varnishing; still, it is better to protect the film.

Blue rays travel more than one per cent. faster than red rays, is one important conclusion arrived at by Dr. J. Young and Professor Forbes, in their recent investigation into the velocity of white and coloured light. As to the rapidity with which light itself travels, this depends upon its nature; the more refrangible is the source of light, the greater is the velocity. An electric light *in vacuo* is estimated to travel at the rate of 187,273 miles per second.

We all know that the ordinary looking-glass, when used as a mirror, furnishes a double image. Mr. Galton told the Photographic Society that this

defect is scarcely noticeable—he did not know why—in an old looking-glass, whereas such glass newly manufactured gave a most marked double reflection. Photographers should note this fact.

The practice of adding hyposulphite in small quantity to the oxalate developer is decidedly gaining ground. In portraiture, the hyposulphite solution is generally added to the developer at once; but for landscape negatives it seems preferable to use pure oxalate at first, and to add the hyposulphite afterwards. If a negative bids fair to be a little too hard, then a few drops of hyposulphite solution should be quickly added.

The best way to employ hyposulphite for development is, we may remind our readers, to make up a very weak solution, one part of hyposulphite being dissolved in two hundred parts of water. Then a few drops more or less does not make much difference. Eder's formula for the preparation of the oxalate developer seems to be still in general favour.

Major Gordon tells us that in Brittany, whether he is going out for a day's fishing, or a day's photography, his equipment is to all appearances the same. He finds his trout-basket a handy and convenient receptacle for camera and plates, while his tripod in its case is apparently a fishing rod, and nothing else.

The soft subdued lighting of Mr. Mendelssohn's portraits in the Exhibition is the subject of general remark. Mr. Mendelssohn has not a square inch of bare glass in his studio. He has few curtains, but covers the whole surface of his glass with tissue paper. This can be replaced in an hour if it gets yellow and dirty, while soiled ground glass is very troublesome to clean.

The simplest way to impart a delicate tint or glaze to cartes-de-visite or cabinets is to add a few drops of aniline dye to some normal collodion, and coat them with it. The mounted photograph is taken in hand like a glass plate, flowed with the tinted collodion, and drained. In a few minutes the picture will have dried, and, according to the consistency of the collodion, will possess more or less finish. If little can be advanced in favour of such treatment, the collodion film has, at any rate, a tendency to preserve the print.

"I never sanction the unscrewing of any of my lenses," we heard Mr. Dallmeyer emphatically state the other day. "If it is pardonable under any circumstances, it is with the No. 1 wide-angle lens; the back combination being removed in this case, a very good view lens will result. But No. 1A, or AA, should never be touched, and, above all, I recommend photographers to let my portrait lenses alone; much mischief may arise from tampering with them."

In coating gelatine plates which have a tendency to exhibit grease spots, Dr. Van Monckhoven advises the manipulation of the emulsion as cool as possible, to get the film as thick as may be. The cooler the emulsion, he says, the less chance is there of the formation of spots; and if it is of concentrated nature, there is a lesser chance still of the vexatious phenomenon.

Mr. Bolas, some time ago, suggested the use of white porcelain vessels in the dark-room, as being more *visible* than transparent glass. A correspondent writes:—"On my laboratory shelf I now have a row of large white egg-cups, which are the most efficient developing cups imaginable."

Have a lock and key to your album if you value its contents. It is not your own fingers, but other people's, that mark the book.

Mr. W. C. Crofts has hit upon something exceedingly good in a small way. He writes to tell us that he makes developing trays for dry-plate

work by turning up the edges of ferrotype plates. What could one have lighter, and more convenient for travelling? Then, again, there is no adhesion between the flexible bottom and the plate, a slight twist on the tray serving to bring one corner of the plate within easy range of the fingers.

Dr. Schnauss does not avail himself of artificial warmth to dry gelatine plates; he prefers to have his drying cupboard fitted with a receptacle containing either calcium chloride or sulphuric acid to absorb the moisture.

Mr. Payne Jennings advocates the coating of gelatine negatives with plain collodion rather than varnishing them. He finds in printing that the paper comes away from the surface in a most satisfactory manner.

Iodide of starch plays such an important rôle in photographic chemistry, that its presence should be insisted upon in every laboratory and studio. As Mr. Spiller and Professor Vogel have pointed out, the compound affords one of the most delicate tests for hyposulphite, and the way to apply the test is very simple. You have simply to place a card or photograph in distilled water for a few hours, in order to dissolve out any hyposulphite that may be present, and if but a trace of the salt passes into the distilled water, the iodide of starch will find it out. The blue tint of the test solution vanishes quickly if the quantity of hyposulphite is appreciable, and less rapidly if there is but a trace.

Iodide of starch, as it is termed, is simply a mixture of iodine and starch. A solution of iodide of potassium is made in water, and in this is dissolved a few crystals of iodine; a little starch is added to this, and the compound is at hand.

A hint in painting backgrounds. Mr. Frederick Piercy suggests the employment of a little brown sugar in distemper painting, which is added to the size solution. One of the difficulties experienced in distemper painting is that the colour dries so rapidly on the canvas, and before you have well time to manipulate; the addition of sugar allows you to work as leisurely as with oil.

Mr. Whaite has conceived the happy idea of protecting the eye from the ruby light of his developing lamp. His lamp is a large one, provided with a powerful oil flame, and with panes of clear ruby glass; it consequently illumines the studio most completely. He, however, never sees the flame itself, and it is particularly that distresses the eye. To mask the flame, there is hung in the most simple manner outside the lamp a piece of cardboard, pear-shaped in form, which is so adjusted that it gets between the eye of the photographer and the flame. If made sufficiently large, one may move about the laboratory and never catch sight of the objectionable red flame at all.

Says a correspondent:—I have found a very good and simple specific against frilling in one of the old YEAR-BOOKS. It consists merely in running a tallow candle round the gelatine plate, so as to make a fatty margin an eighth of an inch broad. Any frilling—at the edges, at any rate—is thereby avoided.

Mounting dry is usually resorted to now-a-days in photographic establishments, where large quantities of cartes and cabinets are produced. The prints, prior to trimming, are coated with starch and permitted to dry. They are then cut to proper size, and carried into the mounting room. A card is damped with a sponge, a print placed upon it, and the two sent through rolling-press. Prints are mounted most quickly and efficiently in this way, but the method will not answer where there are wide margins; for in this case picture and card cannot be well put into the rolling-press together.

The toning of collodion transfers and opal enlargements frequently gives trouble, and many will care to know that large producers of portraits of this kind—such as Messrs. Brown, Barnes, and Bell, of Liverpool, and M. Lafosse, of Manchester—do not tone at all. The former firm sometimes put a little gold in the fixing bath, but this is only on rare occasions. Experience in developing alone yields a good tone, in the opinion of these gentlemen. The Liverpool firm have a predilection for pyrogallic development in summer, and iron development in the winter. For opal work they like a very limpid collodion which contains plenty of cadmium.

"Put a lump of alum in your developer," was the practical advice of a practical man the other day to one who complained of frilling. Sometimes the gelatine film will not remain intact during a long course of development in hot weather, and this simple remedy is therefore worth noting just now. It retards development a little, but that is all.

As to turning cubic centimetres into ounces, or ounces into drachms, and scruples into cubic centimetres, nothing can be easier, if our correspondents will only follow the plan we have advocated time after time. It is one which involves no complicated ciphering, no tedious long division, no head-breaking equations. There can never be question of a mistake arising from an error in arithmetic, nor from stupidly dividing instead of multiplying; no puzzling rule-of-three, no practice to drive one mad. Our plan consists simply in the purchase for a few pence of a graduated glass measure divided into cubic centimetres, such as is in the possession of every chemist of the Old World and the New, and in taking care to have this always within reach. To turn ounces into cubic centimetres, you have then simply to turn water from your ounce measure into your cubic centimetres measure, and read off; to convert cubic centimetres into ounces you reverse the operation.

The Bank of France has almost entirely abandoned chemical tests in favour of the camera for detecting forgeries. The sensitive plate not only proclaims forthwith the doings of the eraser or penknife, but frequently shows, under the bold figures of the forger, the sum originally borne by the cheque. So quick is the camera to detect ink marks, that a carte-de-visite enclosed in a letter may to the eye appear without blemish, while a copy of it in the camera will, in all likelihood. exhibit traces of writing across the face, where it has merely been in contact with the ink.

The reproduction of faded cartes-de-visite forms now-a-days a considerable item of the photographer's work, the sins of the fathers being, indeed, visited on their children. Fortunate it is for us that the camera can see so much more, in the yellow images, than is perceptible to the eye, and does its work in a manner that far exceeds one's expectations.

Shadows cast by the paper itself are the chief difficulties in the way of copying faded photographs. The fibre or tiny indentations over the surface cause these almost imperceptible shadows, and the stronger the light is coming from one direction, the more definite will they be. To break up the light as much as possible should, therefore, be the aim of photographers, some of whom put the picture in a sort of tray with sloping tin-foil sides, which effectually scatter the illumination over the surface of the photograph.

According to Vogel, solutions of gelatine in organic acids may be diluted with alcohol without any precipitation of gelatine.

Obernetter has gone a step further, and discovered that the acids most favourable to the purpose are boracic acid, acetic acid, formic acid, citric acid, lactic acid, oxalic acid, succinic acid, benzoic acid, &c. A ten per cent. aqueous

solution of oxalic acid or succinic acid easily dissolves half its weight of gelatine, we are told, and this may then be diluted with three times its volume of absolute alcohol, without any precipitation taking place. In this way a solution is obtained which, at a temperature of 19° C., is of the consistence of ordinary collodion; but below this temperature the mixture sets. The solution may, indeed, be still further diluted with eighty per cent. of alcohol, supposing this contains one or two per cent. of acid.

The small coffee percolators, so much used in Paris, can be made to do good service to the gelatino-bromide worker—the collotype or the carbon printer. The size sold for making one cup of coffee can be bought for a franc, con-

tains about eight fluid ounces, and is suited for small batches of emulsion; while larger ones, capable of holding several pints, are more especially useful to the carbon printer. In obtaining these percolators, it is important to select those made of a kind of earthenware which is vitrefied throughout, or serious mischief may result from old and partly-decomposed chemicals being conveyed to fresh batches.

Eder and Toth's plan of incereasing the sensitiveness of bromo-gelatine plates by bathing them in a solution of citric acid and silver is certainly very practical. The solution is made up of—

Citric acid	10 parts
Nitrate of silver	10 „
Water	100 „

To this mixture are added from 100 to 200 parts of alcohol. The sensitiveness is at least doubled by the operation. When the gelatino-bromide has not been carefully washed, a weak bath of this nature does not have much effect, because the soluble bromide contained in the plates renders the nitrate of silver inactive; but in this case it is only necessary to add twice as much silver nitrate to the alcohol, in order to produce the desired effect.

The velvet roller still holds its own in the photo-lithographic establishment at Woolwich. Blue bank post paper is coated once with a solution of bichromated gelatine, dried, and printed under a line negative. The print is soaked in water, then taken out and stretched over a glass plate, the ends being tucked under the glass, and in this state is ready for rolling up with the velvet roller; transfer ink about the consistence of butter is used with the roller, and after ten minutes' manipulation a most delicate transfer is at hand, that any ordinary lithographer can deal with.

Standard Formulæ and Memoranda.

STANDARD FORMULÆ.

Collodion.

Sulphuric acid	... ...	6 ounces
Nitric acid 1·450	... ...	4 ,,
Water	... ...	2 ,,

The temperature will rise to 170°. Wait till it cools down to 100°. Immerse dry cotton-wool (best carded and of long fibre). Be sure wool is dry. Draw it in long flakes, and pull it under acids with stout piece of glass. Do not crowd in too much. Take care each tuft is well wetted before putting in fresh tuft, carefully cover vessel, and put it where any slight fumes may escape. Leave for at least twelve hours—twenty hours will not spoil it. When ready, lift cotton out and plunge in large quantity of water quickly, separating tufts with glass rods or bars of stout glass. Wash in changes of water till no acid is left. Wring cotton in coarse towel as dry as possible, and then pull out tufts, and place in the air to dry. Collodion made with this cotton will be very soluble, and will leave no sediment. Five to six grains will dissolve in one ounce of mixed either and alcohol, and still the collodion will be very fluid.

To Iodize one pint of Collodion with above.

No. 1.—Alcohol	... ...	10 ounces
Sulphuric ether	... ...	5 ,,
Cotton as above	... ...	100 grains

To Iodise.

No. 2.—Alcohol	... ...	5 ounces
Iodide of ammonium	...	60 grains
Iodide cadmium	... ...	30 ,,
Bromide cadmium	... ...	20 ,,

Shake till dissolved, and then pour into No. 1.

Another plan, better for small quantities:—

Dissolve the iodides, as above, in 10 oz. of alcohol, then put in 100 grs. of cotton, and shake well. Lastly, add 10 oz. of ether, and shake till cotton is dissolved. This collodion will be ready for use in a few hours, but will improve with age.

Enamel Collodion.

Pyroxyline (Hopkin and Williams)		120 grains
Meth. spirit	... ...	10 ounces
Meth. ether sulph.	... ...	10 ,,
Castor oil	... ...	20 drops

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Saturated Solution of Iron.

Fill a Winchester quart three parts full of crystals of protosulphate of iron, and add one ounce of sulphate of copper or zinc. Fill up with water, shake well repeatedly. Carefully cork bottle, and lay it gently on its side until next morning. Again shake, and the solution will be ready for use. Always keep full up to stopper with water. Always have the bottle half full of crystals. The use of the sulphate of copper or zinc is to prevent the formation of sediment of persulphate of iron.

Developer with above Solution.

Iron protosulphate (sat. sol. as above)	2 fluid ounces
Acetic acid	1 ounce
Water	20 ounces

Iron Developer for Negatives.

Protosulphate of iron (sat. sol.)	2 fluid ounces
Sulphate of copper	1 drachm
Nitrate of baryta	1 ounce
Glacial acetic acid	½ ,,
Water	20 ounces

When dissolved, filter out white deposit, and keep closely corked.

Henderson's Iron Developer.

Protosulphate of iron ...	20 grains
Glacial acetic acid	20 minims
Alum...	40 grains
Water	1 ounce

Nitrate of Iron Developer for Ferrotypes.

Protosulphate of iron ...	1½ ounce
Nitrate baryta	1½ ,,
Nitric acid	20 drops
Water	20 ounces

When dissolved, filter from dense white deposit of sulphate of baryta, and keep in closely-corked bottle. N.B.—It rapidly spoils when exposed to the air. Pictures by this process are of a very brilliant pearly white.

Intensifying Solution for Wet-Plate Negatives.

No. 1.—Protosulphate of iron (sat. sol.)	2 ounces
Acetic acid	1 ounce
Citric acid...	½ ,,
Water	20 ounces

Silver solution, as much as is necessary to make negative dense.

No. 2.—Pyrogallic acid	10 grains
Citric acid...	25 ,,
Distilled water	2 ounces

Add a few drops of nitrate of silver solution, 10 grains per ounce.

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Developer for very Delicate Transparencies.

Pyrogallic acid	3 grains
Citric acid...	1 grain
Water	1 ounce

This development is slow, but the deposit is very fine. Tone with gold, 1 grain to 10 ounces of water.

Mawdsley's Developer for Dry Plates.

No. 1.—	Liq. ammonia fort. ...	1 ounce
	Bromide potassium ...	160 grains
	Water	80 ounces
No. 2.—	Pyrogallic acid	3 grains
	Water	1 ounce

Equal parts of 1 and 2 for properly exposed picture.

Swan's Developer.

No. 1.—	Pyrogallic acid	2 grains
	Water	1 ounce
No. 2.—	Liq. amm. (·880)... ...	1 ounce
	Bromide ammonium ...	¾ ,,
	Water	80 ounces

Equal parts of 1 and 2.

Nelson's Developer.

No. 1.—	Pyrogallic acid	1 ounce
	Methylated spirit ...	7 ounces
	White sugar	1 ounce
	Distilled water	3 ounces
No. 2.—	Liq. amm. (·880) ...	4 ounces
	Bro. amm.	1 ounce
	White sugar	½ ,,
	Water	2 ounces

For half-plate take ½ drachm of No. 1 and put in developing cup. Now take ½ drachm of No. 2 and dilute with 1½ ounces of water; pour No. 2 thus diluted on to No. 1, and develop immediately.

Modification of Nelson's Developer.

No. 1.—	Pyrogallic acid	40 grains
	Water	20 ounces
	Nitric acid...	4 drops
No. 2.—	Liq. ammonia	1 ounce
	Bro. ammonium	2 drachms
	Water	20 ounces

For half-plate take 1 ounce each of Nos. 1 and 2; pour No. 2 on to No. 1, and develop immediately. The addition of nitric acid will make No. 1 keep for several days. If the image is thin, make No. 1 60 grains pyrogallic to 20 ounces of water.

Iron Developer for Dry Plates.

(*a*).—	Water	12 ounces
	Protosulphate of iron ...	4 ,,
(*b*).—	Water	24 ounces
	Neutral oxalate of potash	8 ,,

To use, mix one part of *a* to two parts of *b*; a con-

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siderable number of plates may be developed at one time.

Wratten's Developer.

No. 1.—Pyrogallic acid	... ...	6 grains
Water	... ...	2 ounces
No. 2.—Liq. amm....	... ...	1 ounce
Pot. bromide	... ...	60 grains
Water	... ...	2 ounces

Pour on No. 1 after soaking the plate in water for a few seconds: now add 5 drops of No. 2, wait till high lights show themselves, and then add 15 or 20 drops more to finish development.

B. Edwards' Developer for Dry Plates.

Stock Solution No. 1.

Pyrogallic acid	... ...	1 ounce
Glycerine	... ...	1 ,,
Methylated spirit	... ...	6 ounces

Mix glycerine and spirit, and add to pyrogallic. Well shake.

Stock Solution No. 2.

Bromide ammonium	...	60 grains
Liq. ammonia ·880	... ...	1 ounce
Glycerine	... ...	1 ,,
Water	... ...	6 ounces

To make developer, add one ounce of No. 1 to 15 ounces of water, and label bottle D (developer). In another bottle mix one ounce No. 2 with 15 ounces of water, and label it A (accelerator). These solutions will keep two or three days. For use, pour out equal parts of D and A, adding A last, just before use. For under-exposure, increase A; for over-exposure, decrease A. Great care must be taken in washing well before fixing, to avoid spots.

Oxalate Developer of M. Alexandre, of Paris.

No. 1. Saturated solution of neutral oxalate of potash. To 1,000 parts of this add 3 parts of bromide of ammonium.

No. 2. Saturated solution of sulphate of iron. To 1,000 parts of this add 2 parts of tartaric acid.

For use, take 4 parts of No. 1, to 1 part of No. 2. If picture is under-exposed, add a little more of No. 2.

Blanchard's Formula for Powder Opalotypes.

Dextrine	... ...	4 drachms
Grape sugar ...	... ...	4 ,,
Bichromate of potash	...	4 ,,
Glycerine	... ...	2 drops
Water ...	... ...	12 ounces

Obernetter's Formula for Powder Process.

Dextrine	... ...	1 drachm
White sugar ...	... ...	$1\frac{1}{4}$,,
Bichromate of ammonia	...	$\frac{1}{4}$ drachm
Water	... ...	3 ounces
Glycerine	... ...	3 or 4 drops

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Woodbury's Formula for Reproduced Negatives.

Gum-arabic	1 drachm
Grape sugar	$\frac{3}{4}$,,
Glycerine	10 drops
Bichromate of potash ...	30 grains
Water	2 ounces

Werge's Formula for Printing-in Artistic Backgrounds by Powder Process.

Dextrine	1 drachm
Sugar-candy	1 ,,
Bichromate of ammonia ...	$\frac{1}{2}$,,
Water	4 ounces

Develop with fine plumbago.

Powder for Reproduced Negs. to be used with above.

Newman's prepared plumbago.

Powder for opalotypes, Best Ivory Black; add a little Indian red if warm tone be required.

To Fix Powder Pictures.

Pour over a saturated solution of boracic acid in alcohol. Dry by heat, and expose to light; dry again before putting into water, to dissolve out bichromate. After two changes of water, add a few drops of sulphuric acid to water (this hardens the film); two changes of water after acid.

Enlarged Paper Prints bg the Powder Process.

Make an enlarged transparency, and varnish it; work up as much as necessary with lead pencil. Now take clean glass plate of the same size. Rub well with French chalk, slightly dust. Coat with plain collodion (iodized collodion will do if plain collodion is not ready to hand). When dry, coat with one of the sensitive mixtures for powder process given above. Dry perfectly over gas stove or spirit lamp in dark room. While still warm, print under the transparency, about three to ten minutes according to light. The image will be faintly visible. Dust on, with large camel's hair brush, finely-powdered ivory black with a little Indian red or any other colour according to taste. When fully developed, cover with collodion, and place in dish with slightly acid water. When all the yellow is washed away, let the plate dry. To transfer, take a piece of Autotype double transfer paper, soak in warm water till slimy. Wet the plate, and apply paper. Squeegee, and let dry. If all has gone well, it should leave the glass readily. These prints are of course permanent.

Sensitising Bath for Carbon Tissue.

Bichromate of potash ...	$1\frac{1}{4}$ ounce
Methylated spirit	4 ounces
Ammonia	1 drachm
Water	30 ounces

The ammonia helps to keep the tissue soluble. The spirit enables it to be dried at a higher temperature.

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Waxing Solution for Carbon Printing.

Yellow resin	3 drachms
Bees'-wax	1 drachm
Turpentine	10 ounces

Ground Glass Varnish for Transparencies.

Gum mastic	40 grains
Gum sandarac	160 ,,
Ether	4 ounces
Benzole	2 to 3 ounces

This varnish may be applied to back of negative for retouching purposes.

Varnish for Wet Plate Negatives.

White hard varnish ...	½ pint
Methylated spirit	(about) 1 pint

Try plate. If too thick, add more spirit. This will be found a capital varnish for retouching purposes.

Varnish for Dry Plates.

Red shellac varnish ...	½ pint
Methylated spirit (about)	1½ pints

Try a plate, and add or lessen spirit according to requirements.

Fritz Luckardt's Retouching Varnish.

Alcohol	300 parts
Sandarac	50 ,,
Camphor	5 ,,
Castor oil	10 ,,
Venetian turpentine	5 ,,

Varnish to Imitate Ground Glass.

Sandarac	18 parts
Mastic	4 ,,
Ether	200 ,,
Benzole	80 to 100 ,,

To Fill Cracks in Varnished Negatives.

Take finely-powdered lamp-black, and rub gently, with circular motion, all over the negative. Use the finger or soft piece of wash leather for the purpose. If properly done, the cracks will have completely disappeared.

To Intensify Gelatine Negatives.

Bichloride of mercury, saturated solution in cold water. (The negative should be placed in alum for a short time before treatment.) Well wash the negative, and immediately pour on mercury solution; do not keep it on too long unless the negative is very thin. Wash well, and immerse in bath of—

Water	10 ounces
Ammonia	10 drops

Leave plate in this solution until the black colour

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goes quite through the film. Well wash. If the mercury solution makes the negative too dense, dilute with water.

Edwards' Intensifying Solution for Gelatine Negatives.

Bichloride of mercury (sat. sol.)	10 ounces
Iodide of potassium ...	10 drachms

Dissolve iodide of potassium in 10 ounces of water, and pour it into a solution of mercury. Shake until red precipitate is nearly dissolved, and then add 1 ounce hyposulphite of soda. Shake until dissolved.

To Make Aqueous Solution of Iodine.

Iodine	60 grains
Iodide potassium	120 „

Add water, gradually shaking between each addition. From 8 to 10 ounces will make a deep ruby solution. This will be found useful for many purposes, especially for several of the intensifying processes for gelatine plates. This is stock solution, and must be diluted with water to sherry colour. Iodine is very sparingly soluble in water without the iodide of potassium.

To Remove Silver Stains from the Hands, &c.

Tincture of iodine (as above)	3 ounces
Liquid ammonia ·880 ...	1 ounce

Rub on with a piece of flannel.

To Intensify Gelatine Negatives with Silver.

After developing and fixing in the ordinary way, place negative in strong alum bath. Well wash. Pour on iodine solution of pale sherry colour as given above. Well wash. Now take iron or pyrogallic intensifier as given above, and add silver according to requirement. When dense enough, place in fixing bath for a few minutes, and then well wash.

Burton's Method for Quickly Drying Gelatine Negatives.

After well washing, place plate in a bath of methylated spirit for two or three minutes. Afterwards flow two or three times with common methylated sulphuric ether. The negative will dry in a current of air in two or three minutes.

To Prevent Frilling.

Soak plate before development in saturated solution of Epsom salts. Wash and develop as usual.

To Reduce Intensity in Gelatine Negatives.

Holmes' ozone bleach ...	1 ounce
Water	4 ounces

Watch carefully, and well wash afterwards.

To Remove Yellow Colour from Gelatine Negatives.

After fixing, soak as long as necessary in a strong solution of alum. The plate may be left, if necessary, for twelve hours in alum solution.

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To Produce Gelatine Negatives Free from Yellow.

Add one drachm of saturated solution of protosulphite of iron to each pint of hyposulphate solution.

Werge's Gold Toning Bath.

Borax ... ... 1 ounce

dissolved in hot water; when all dissolved, dilute to 80 ounces. Keep this in Winchester quart as stock solution. To tone, take for each grain of gold 8 ounces of above solution; mix. The bath is ready for work at once.

No. 2.—Chloride of gold	1 grain
Acetate of soda	20 grains
Water	8 ounces

Lime Toning Bath.

No. 3.—Chloride of gold	1 grain
Whiting	30 grains

Pour on eight ounces of boiling water, and stir. Now add one drop of saturated chloride of lime solution. When cool, bath is ready for use.

No. 4.—Chloride of gold	1 grain
Bicarbonate of soda	3 grains
Water	8 ounces

To be used at once.

No. 5.—Chloride of gold	1 grain
Phosphate of soda ...	30 grains
Water	8 ounces

Collodion Enlargements—Croughton's Method.

Soak polished flatted crown glass in soda for some time. After well washing, immerse in weak sulphuric or hydrochloric acid, say one ounce to quart of water. Rinse well, and dry with clean cloth. Polish with wash-leather. Well wax polished side of glass with waxing solution made as follows:—

Yellow bees'-wax	1 drachm
Benzole	3 ounces

Use weak acid bath of nitrate of silver. Develop with iron as follows:—

Protosulphate of iron ...	6 drachms
Glacial acetic acid	2 ounces
Citric acid	60 to 80 grains
Sugar-candy	30 ,,
Water	20 ounces

Fix in hyposulphate 4 ounces to pint of water. Well wash. For transfer, use Autoype double transfer paper. Soak twenty minutes in cold water. Now place paper in hot water till surface feels slimy. Place face down on the wet collodion surface, and gently squeegee. When dry, the picture will come from glass.

To Prevent Collodion Films Splitting.

A weak solution of dextrine or gum floated over plate while wet, or a little stale beer will also answer.

Backing for Dry Plates to Prevent Halation.

Burnt sienna	100 grains
Dextrine	30 ,,
Glycerine	2 ,,

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To Enamel Photographs.

Take a piece of glass of size required, free from scratches (plate-glass is best). Clean perfectly. When dry, rub over with French chalk. Well dust with brush. Coat with enamel collodion, as given above. When well set, place in dish of water. Soak prints to be enamelled in water. Afterwards place in *weak* solution of warm gelatine. Place print, face downwards, on collodionized plate, and squeeqee. When dry, the print will readily strip from the glass.

England's Method of Enamelling.

Proceed as above, but omit gelatine. Take the print from cold water. Lay carefully upon collodionized glass, and squeegee. When dry, the will easily leave the glass.

Abney's Method for Increasing the Sensitiveness of the Ferrous Oxalate Developer.

Add 10 to 40 drops, according to requirement, of a 2½-grain solution of hyposulphite to 3 ounces of developer.

Collodio-Chloride Process.

16-gr. alcoholic sol. nit. sil., 1 oz. (by pounding silver salt with methylated spirit in a mortar).

Sulphuric ether	1 ounce
Pyroxyline	12 to 14 grains

When dissolved, add 1½ dr. 16-gr. alcoholic sol. chloride calcium; shake well, and keep carefully from light. A sizing of arrowroot should be applied to paper before pouring on collodio-chloride.

To Clean off Old Films, Varnished Collodion, or Gelatine.

Grey lump potash (crude carbonate of potash), to be obtained of oil and colourman, ½ pound. Place in stone pan or deep tin baking dish; pour 2 pints boiling water on potash, and immerse plates one by one till dish is full; soak for one hour; pour off solution, and fill up with water. Now proceed to clean in the ordinary way. The film will come off without any labour. This solution will not injure the surface of the glass, like soda.

Water-tight Solution for Wooden Dishes.

Common brown resin ...	½ pound
Bees'-wax	2 ounces

Melt together in tin pan (preserved-meat tin will do); when quite fluid, run solution rapidly all over where required. Wood must be perfectly dry.

Waterproof Glue for Wooden Dishes.

Soak ½ pound of best glue in cold water until quite soft, melt in glue kettle. When quite dissolved, pour in 1 ounce of hot saturated solution of bichromate of potash, and well stir. It is now ready for use; apply with brush. Put the article so treated to dry in full daylight for a day or two, and then apply strong alum solution. The vessel is now ready for use, but must be washed first.

STANDARD FORMULÆ.

Cowan's Solution af Pyrogallic Acid Ready for Use

Pyrogallic	1 ounce
Citric acid	60 grains
Water	109 ounces

Dissolve the citric acid in water, and add the pyrogallic. The solution will contain 4 grains of pyrogallic to the ounce of water, and will keep good for months. For convenience, half the quantity of water may be used, when the strength will be 8 grains per ounce. In using it, dilute according to formula employed.

Cowan's Method of Readily Varying the Proportions of Bromide in the Developer.

Make two stock solutions as follows:—

No. 1.

Liquid ammonia, 880° ...	5 ounces
Ammonium bromide	5 ,,
Water ... to make	15 ,,

No. 2.

Liquid ammonia	5 ounces
Water	10 ,,

For use, make up as below. The number representing the amount of bromide in drachms, and the ammonia to make up an ounce in each case:—

No. 1 take 1 dr. of No. 1 to 7 drs. No. 2
No. 2 ,, 2 drs. of No. 1 to 6 drs. No. 2
No. 3 ,, 3 drs. of No. 1 to 5 drs. No. 2
No. 4 ,, 4 drs. of No. 1 to 4 drs. No. 2
No. 6 ,, 6 drs. of No. 1 to 2 drs. No. 2
No. 8 ,, 8 drs. of No. 1

For use, take 30 minims of any of these, to 2 ounces of pyrogallic solution; or, if desirable to use with equal bulk of pyrogallic solution, then dilute each ounce with 15 ounces of water, and take an ounce of this to each ounce of pyrogallic solution; but the strength of the pyrogallic must be doubled.

	Bromide.	Ammonia.
1 ounce of No. 1 contains	20 grs.	160 minims
1 ,, of No. 2 ,,	40 ,,	160 ,,
1 ,, of No. 3 ,,	60 ,,	160 ,,
1 ,, of No. 4 ,,	80 ,,	160 ,,
1 ,, of No. 6 ,,	120 ,,	160 ,,
1 ,, of No. 8 ,,	160 ,,	160 ,,

Constant quantity of ammonia to each ounce of pyrogallic is 5 minims. In No. 1 the proportion of bromide to the ammonia is ⅛ as recommended by Wratten and several other makers. In No. 2, the proportion is ¼, as recommended by Nelson. No. 6 is ¾, and is very nearly the proportion now recommended by Swan; whilst No. 8 is half of each, as originally recommended by Swan. It will be seen, therefore, that the requirements of any maker can be met at once withont any trouble by adopting above method. By giving sufficient time in the development, as much detail can be brought out by No. 8 as by No. 1, for bromide simply *retards*, but does not *stop*, development.

MEMORANDA.

STANDARD FORMULÆ.

MEMORANDA.

To Easily Keep Negative Bath in Good Order.

Shake up bath with small quantity of carbonate of soda. Use a large porcelain filter, holding at least a pint of solution. Put in plug of tow, and filter solution. When the plug is well filled with the carbonate of silver formed, the filter will be perfect. Never wash filter, and never add acid. Empty both into filter every night after use, and pinholes will never appear. When bath is charged with ether, boil down in evaporating dish to half quantity; when cool, add distilled water to make original strength.

To Put Prints Neatly in a Scrap Book.

Trim and well iron the photographs. Now lay face downwards, and lay a piece of glass half-an-inch smaller each way than photograph; this will hold photograph firmly down. Paste the edges only with above solution made very thin, and quickly lay down in book. Rub well, and when dry the picture will be perfectly flat without any sign of cockling.

Adam Salomon's Encaustic Paste.

Pure virgin wax	... ...	500 parts
Gum elemi	... ...	10 ,,
Benzole	... ...	200 ,,
Essence of lavender	... ...	300 ,,
Oil of spike	... ...	15 ,,

Encaustic Paste.

Best white wax (cut in shreds)		1 ounce
Turpentine	... ...	5 ounces

Dissolve with gentle heat, and pour out in pomatum pot. If too hard when cold, add a little more turpentine.

To Give a Mat Surface to Prints on Albumenized Paper.

Mount the print in the ordinary way, but be careful to avoid any lumps. Well roll, and then sift on finely-ground pumice powder. Rub gently with palm of the hand, using circular motion. Examine from time to time. Continue operation until the proper surface is obtained.

Burton's Method of Sensitizing Carbon from Back.

Bichromate Solution.

Water	... ...	20 ounces
Liquid ammonia	... ...	1 ounce
Bichromate of potash	...	4 ounces

Cut up tissue some time before use, and place under a weight to flatten. When ready for use, place face downward, and spread solution with a sponge, or, better still, a Blanchard brush. Take care it is uniformly wet, say for three minutes, and then pin up to dry. This method is very useful where large sheets are wanted.

To Clean a Tarnished Daguerreotype.

Take a strong solution of cyanide of potassium, and, after well washing silver plate, pour it on gently,

STANDARD FORMULÆ.

MEMORANDA.

and keep it in motion. Do not keep solution long on plate, but pour off and well wash. Should the tarnish still remain, pour on more of solution, and repeat operation till the plate is clean; finally, wash with distilled water, and dry over gas flame or spirit lamp, blowing on plate all the time to drive off the water evenly.

Platinotype Process.

Expose the sensitized paper under a negative as usual. Time about one-third for ordinary albumenized paper. Print may be examined in feeble light; a faint image will be visible. To develop, take a solution of potassic oxalate, and heat up to 170° to 180° in glazed iron dish. Potassic oxalate solution to be as follows:—

Potassic oxalate	... ...	130 grains
Water	... ...	1 ounce

Draw print face downwards slowly over the above hot solution, taking care to avoid air-bubbles. For over-exposed prints, lower the temperature of bath to 80°. For under-exposed prints, increase temperature to 190°. Great latitude of temperature is possible, according to requirements. After developing, the print is immersed in weak solution of hydrochloric acid as follows:—

Hydrochloric acid	... ...	1 ounce
Water	... ...	80 ounces

Prints to remain in acid bath ten minutes, and afterwards washed in three or four changes of water during half-an-hour.

To Clean Negatives Stained by Silver.

Take a plug of cotton wool and well wet it with cyanide of potassium, rub gently all over the negative, using a little more force on the stained parts. Well wash. Dry on blotting-paper. If necessary to re-varnish, flood the plate once or twice with methylated spirit. Let dry, and then varnish in the ordinary way.

Mounting Solution for Scrap Books, &c.

Soak half-a-pound best glue in cold water till soft. Melt the glue in kettle or earthen jar standing in a saucepan. When quite thin, pour in gradually methylated spirit, stirring well between each addition until quite clear. Strain through coarse muslin into pickle bottles. Well cork, and store away for use. When wanted, stand bottle in hot water till glue is melted.

Adam-Salomon's Method of Reducing Over-printed Proofs.

Immerse for a short time in a solution made as below—

Cyanide of potassium	...	5 grains
Liquid ammonia	... ...	5 drops
Water ...	... ...	1 pint

Carefully watch the prints, and well wash afterwards.

TABLES

FOR THE

CONVERSION OF GRAMMES, OUNCES, AND GRAINS.

CONVERSION OF GRAMMES INTO GRAINS.

Grammes	Grains
1	15·43
2	30·86
3	46·29
4	61·73
5	77·16
6	92·59
7	108·03
8	123·46
9	138·89

ONVERSION OF GRAINS INTO GRAMMES.

Grains	Grammes
1	·0648
2	·1296
3	·1944
4	·2592
5	·3240
6	·3888
7	·4536
8	·5184
9	·5832

CONVERSION OF GRAMMES INTO TROY OUNCES.

Grammes	Troy ounces
1	·03215
2	·06430
3	·09645
4	·12860
5	·16075
6	·19290
7	·22505
8	·25720
9	·28935

CONVERSION OF GRAMMES INTO AVOIRDUPOIS OUNCES.

Grammes	Avoirdupois ounces
1	·03527
2	·07054
3	·10581
4	·14108
5	·17635
6	·21162
7	·24689
8	·28216
9	·31743

The above tables render the conversion of the weights in question a matter of great ease, the error introduced in the last decimal place being trivial.

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324·51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

Portions of original number	Equivalents in grains
300·00	4630·
20·00	308·6
4·00	61.73
·50	7·716
·01	·1524
	5008·1984

The required quantity is 5008·2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table, and finds 46·30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this by 100, or gives the required number. In a similar manner, by shifting the decimal place of 30·86 one place to the right we obtain the value in grains of 20 grammes; while the number 61·7 is taken from the table without alteration as the equivalent of 4 grammes. For ·50 the table number must have its point shifted on to the left, making it 7·716 instead of 77·16; and finally, the value of ·01 is obtained by shifting the point of 15·43 two places to the left.

The above operations are, in actual practice, performed with considerable speed, the required equivalents being written down one after the other on a scrap of paper, and then added up.

WEIGHTS AND MEASURES, AND THERMOMETER TABLE.

WEIGHTS AND MEASURES.

480·0 grains Troy = 1 oz. Troy.
437·5 grains Troy = 1 oz. Avoirdupois.

5760·0 grains Troy = 1 lb. Troy.
7000·0 grains Troy = 1 lb. Avoirdupois.

MEASURES OF LENGTH.

Millimetre = 0·03937 inch.
Centimetre = 0·39371 inch.

Decimetre = 3·93708 inch.
Metre = 39·37079 inch.

Inch = 2·5399 centimetres.

Foot = 3·0479 decimetres.

MEASURES OF SURFACE.

Square inch = 6·4513 square centimetres.

Square foot = 9·2899 square decimetres.

MEASURES OF CAPACITY.

Cubic centimetre = 0·0610 cubic inch.
Ditto, ditto = ·00176 pint.

Litre, or cubic decimetre } = 61·0270 cubic inch, or 1·760 pint.

Cubic inch = 16·3861 cubic centimetres.

Gallon = 4·5434 litres.

MEASURES OF WEIGHT.

Milligramme = 0·0154 grains.
Centigramme = 0·1543 grains.
Decigram = 1·5432 grains.

Gramme = 15·4323 grains.
Kilogramme = 15432·3488 grains.

Grain = 0·0647 grammes.

Troy oz. = 31·1034 grammes.

THERMOMETER TABLE.

Comparison of Centigrade and Fahrenheit.

Cent.	Fah.	Cent.	Fah.	Cent.	Fah.	Cent.	Fah.	Cent.	Fah.
−17.7	0	7	44·6	31	87·8	55	131	78	172·4
−16	3·2	8	46·4	32	89·6	56	132·8	79	174·2
−15	5	9	48·2	33	91·4	57	134·6	80	176
−14	6·8	10	50	34	93·2	58	136·4	81	177·8
−13	8·6	11	51·8	35	95	59	138·2	82	179·6
−12	10·4	12	53·6	36	96·8	60	140	83	181·4
−11	12·2	13	55·4	37	98·6	61	141·8	84	183·2
−10	14	14	57·2	38	100·4	62	143·6	85	185
− 9	15·8	15	59	39	102·2	63	145·4	86	186·8
− 8	17·6	16	60·8	40	104	64	147·2	87	188·6
− 7	19·4	17	62·6	41	105·8	65	149	88	190·4
− 6	21·2	18	64·4	42	107·6	66	150·8	89	192·2
− 5	23	19	66·2	43	109·4	67	152·6	90	194
− 4	24·8	20	68	44	111·2	68	154·4	91	195·8
− 3	26·6	21	69·8	45	113	69	156·2	92	197·6
− 2	28·4	22	71·6	46	114·8	70	158	93	199·4
− 1	30·2	23	73·4	47	116·6	71	159·8	94	201·2
0	32	24	75·2	48	118·4	72	161·6	95	203
1	33·8	25	77	49	120·2	73	163·4	96	204·8
2	35·6	26	78·8	50	122	74	165·2	97	206·6
3	37·4	27	80·6	51	123·8	75	167	98	208·4
4	39·2	28	82·4	52	125·6	76	168·8	99	210·2
5	41	29	84·2	53	127·4	77	170·6	100	212
6	42·8	30	86	54	129·2				

SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.*

Element.	Symbol.	Atomic Weight.	Observer.
Aluminium	Al	7·26	Berzelius
Antimony	Sb	122·3	Kessler; Dexter
Arsenic	As	77·15	Kessler
Barium	Ba	137·16	Marignac
Bismuth	Bi	210·0	Dumas
Boron	Bo	11·04	Berzelius
Bromine	Br	79·95	Stas
Cadmium	Cd	112·04	Lenssen
Cæsium	Cs	133·00	Johnson and Allen; Bunsen
Calcium	Ca	40·00	Erdmann and Marchand
Carbon	C	12·00	Dumas and Stas; Liebig
Cerium	Ce	92·16	Rammelsberg; 91·34, Wolf
Chlorine	Cl	35·46	Stas
Chromium	Cr	52·08	Siewert
Cobalt	Co	58·74	Russell
Copper	Cu	63·12	Millon and Commaille
Didymium	D	94·96	Hermann
Erbium	E	112·6	Bahr and Bunsen
Fluorine	F	18·96	Luca; Louyet
Glucinum	Gl	9·30	Awdejew; Klatzo
Gold	Au	196·71	Berzelius
Hydrogen	H	1	Dulong and Berzelius
Indium	In	113·4	Winkler; Bunsen
Iodine	I	126·85	Stas
Iridium	Ir	196·87	Berzelius
Iron	Fe	56·00	Dumas
Lanthanum	La	92·88	Hermann; 90·18 Zschiesche
Lead	Pb	206·92	Stas
Lithium	Li	7·02	Stas
Magnesium	Mg	24·00	Dumas
Manganese	Mn	54·04	Schneider
Mercury	Hg	200·00	Erdmann and Marchand
Molybdenum	Mo	96·00	Dumas; Debray
Nickel	Ni	58·74	Russell
Niobium	Nb	94·0	Marignac
Nitrogen	N	14·04	Stas
Osmium	Os	199·03	Berzelius
Oxygen	O	16·00	
Palladium	Pd	106·57	Berzelius
Phosphorus...	P	31·00	Schrotter
Platinum	Pt	197·18	Andrews
Potassium	K	39·13	Stas
Rhodium	Rh	104·21	Berzelius
Rubidium	Rb	85·40	Bunsen; Piccard
Ruthenium...	Ru	104·40	Berzelius
Selenium	Se	79·46	Dumas
Silver	Ag	107·93	Stas
Silicon	Si	28·10	Dumas
Sodium	Na	23·04	Stas
Strontium	Sr	87·54	Marignac
Sulphur	S	32·07	Stas
Tantalum	Ta	182·30	Marignac
Tellurium	Te	128·06	v. Hauer
Thallium	Tl	203·64	Crookes
Thorium	Th	115·72	Delafontaine
Tin	Sn	118·10	Dumas
Titanium	Ti	50·00	Pierre
Tungsten	W	184·00	Schnieder; Dumas; Roscoe
Uranium	U	118·80	Ebelmen
Vanadium	V	51·35	Roscoe
Yttrium	Y	61·70	Bahr and Bunsen
Zinc	Zn	65·16	Axel Erdmann
Zirconium	Zr	89·60	Marignac

* From Thorpe's "Quantitative Analysis."

CONTENTS.

CONTRIBUTORS

For Abridged Catalogue, see page xxxiii.

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FANCY, PLAIN, REMBRANDT, ETC., ETC.

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—) *1882.* (—

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My recently introduced backgrounds comprise those suitable for the stocking of a new gallery, as well as several suitable for making special exhibition pictures.

No.		No.	
——	**Vienna Tapestry.**	**439.**	**New Eastlake.**
440.	**The Villa (summer).**	**435.**	**The Winter Road.**
433.	**The Rustic Wall.**	**426.**	**The Palisades.**

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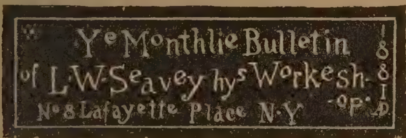
414. Seavey's Eastlake Cottage and Balcony.

441. The Garden Wall (3 parts).

—— The New Garden Seat (3 changes).

Head-Rest Plants (summer on face, winter on back), for hiding the lower part of head-rest; very useful. Sample prints, to be returned, sent to responsible photographers on receipt of stamp.



Under the foregoing heading, in the "Specialty" columns of the several Photographic Journals of America, will appear, from month to month, brief announcements of my new productions.

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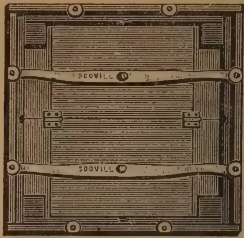
ATWOOD'S PATENT REVERSIBLE

Printing  Frame.

This Frame is square, and just as it is shown in the accompanying illustration. It is made with double corners, and in utility combines the action of the regular and the lengthwise Printing Frames.

It will be seen that the back, also, of this Frame is square, with small blocks cut out to fit the corners, thus allowing the back to be placed upon the negative so that the springs and hinges will extend either lengthwise or crosswise of the subject. The advantage of this action will easily be perceived.

Suppose the negative of a standing figure to have been placed in the Atwood Frame, and the back put in with the springs parallel to the length of the subject. Either half of the back board can be opened and thrown over on the other, in this manner allowing such an examination of the print as to show a view from the head to the foot.

Again, in printing from a group negative, the back of the Atwood Frame can be placed to open crosswise of the negative, thus giving an opportunity, when examining the print, of seeing all the faces.

In printing a landscape where cloud negatives are used, and the back has been set in the manner just described, it is possible to contrast the sky with the other features of the view on the print.

There is no reason why prints from two 5 x 8 negatives of different subjects may not be made at one time in an 8 x 10 Atwood Frame. Other good uses will be apparent, and we need not enumerate them. The back can be made to open two-thirds instead of at the centre, where so desired and ordered.

PRICE LIST

ATWOOD PATENT REVERSIBLE PRINTING FRAMES.

Size for ½ negatives, each,	- - -	$0 75
" 4 x 4 " "	- - - -	90
" 8 x 10 " "	- - -	1 20
" 10 x 12 " "	- - - -	1 60
" 11 x 14 " "	- - -	2 75
" 13 x 16 " "	- - - -	3 50

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3¼ x 4¼	inches	$0.80	5 x 7	inches	$2.10	11 x 14	inches	$8.50
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4¼ x 5½	"	1.25	6½ x 8½	"	3.00	18 x 22	"	22.00
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5 x 8	" " " " " "	.20
8 x 10	" " " " " "	.30
16 x 21	" " " " in sheets, rolled,	1.10
19 x 24	" " " " " "	1.75
22 x 28	" " " " " "	2.50
Ferro Prussiate Paper, endless roll, 40 in. wide, per yard,		.70
" " " 54 in. " "		1.25

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are made expressly for us of selected metal. Each bath will be warranted **PERFECT** in every respect. (We cannot guarantee against breakage in transportation.)

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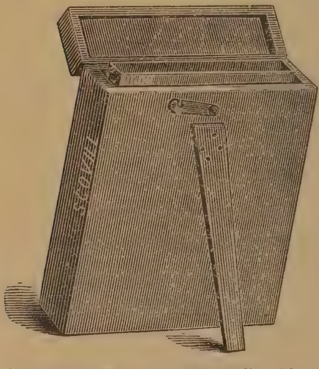
Side Inside Measurement.	In Original Package. EACH.	In Boxes. A. O. Co. make, for Studio. EACH.	In tight top Boxes. A. O. Co. make, for Outdoor. EACH.
4 x 5	$0.87	$2.19	$5.00
5 x 7	1.35	2.50	5.31
7 x 9	2.00	3.44	6.25
7 x 10	2.12	3.75	6.56
9 x 12	2.87	5.00	7.81
11 x 14	4.25	7.19	10.00
12 x 16	6.00	8.75	11.56
16 x 20	16.00	18.75	21.88
18 x 24	40.00	41.25	41.25
20 x 26	62.50	67.50	71.25



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S. P. C.

Oxalate Developing Bottle.

PRICES ARE AS FOLLOWS:

				EACH.
Bottle to hold	1 Pint of Solution,		-	$ .60
" "	1 Quart	"	-	.75
" "	2 "	"	-	1.00
" "	1 Gallon	"	-	1.25

DIRECTIONS FOR USE.

Into the bottle pour 24 ounces of Oxalate of Potash Solution, and on this pour oil (lard, parafine, or machine will answer), so as to cover the Oxalate with a layer half an inch thick. Now pour into the bottle 3 ounces of Protosulphate of Iron Solution, which, passing through the oil and mingling with the Oxalate Solution, forms Ferrous Oxalate Developer. After immersing the Gelatine Plate in water, and pouring this off, place the japanned pan or dish containing the Gelatine Plate in such a relative position to the Developing Bottle that, by lifting the cork out of the bottle, and at the same time pressing flat the rubber tube, either forward or back of the cork, with the fingers, this end of the rubber tube can be brought over the japanned pan, and by releasing the pressure the Oxalate Developer will flow into the pan. When a sufficient quantity has been drawn down, replace the cork in the bottle, and keep it there until after completing the development of a plate; then pour the remaining developer back into the bottle, for the oil will keep the air from the solution, and it may be used over and over again. If the developer shows signs of weakening, a small quantity of the Protosulphate of Iron Solution may be added to strengthen it.

The formula for the Oxalate of Potash is:

Water, - - - - - -	*20 Ounces.*
Neutral Oxalate of Potash, -	*5 "*
Bromide of Potassium, - -	*20 Grains.*

If this solution will not turn blue litmus paper red, add a few drops of a saturated solution of oxalic acid until it will effect such a change of color.

The Protosulphate of Iron Solution is made up of:

Water, - - - - -	*20 Ounces.*
Protosulphite of Iron, - -	*5 "*
Sulphuric Acid, - - -	*20 Drops.*

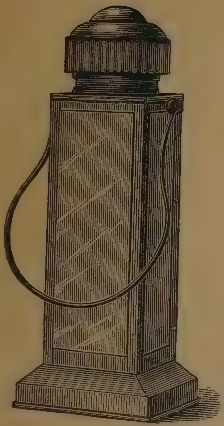
Ask your dealer for S. P. C. Bottles, or order from the

SCOVILL MANUFACTURING CO.

—THE—

Scovill Dry Plate Lantern.

PRICE, $1.50 EACH.



Designed especially for use by the photographer or amateur in the dark room, when developing plates and putting them in the plate holders. Guaranteed, when lighted and closed up, to throw out nothing but ruby rays. It has 63 square inches of glass, through which enough light shines to enable the occupant of the dark room to watch the development of the largest size dry plates made, and at the same time to see the chemicals and everything used in manipulation. The illustration here presented conveys a good idea of the lantern when closed.

In height the Scovill Lantern is a trifle over 12 inches, and it is 4½ inches square. Each corner is protected by a strip of metal, which acts as a double safeguard. It not only prevents white light from the inside stealing out there, but it also keeps the four panes of ruby glass from any ordinary risk of breakage. For the latter reason the Scovill Dry Plate Lantern is a great improvement over lamps with ruby chimneys, which, being unguarded, are so easily cracked or broken, and such a trouble to replace. In point of safety this Lantern is infinitely to be preferred to a lamp of any style. By patented devices the top vent and the lower draft holes are so constructed that no white rays can escape through them, and thus the Lantern is perfected for use in the dark room.

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